Rock Products

DEVOTED TO THE PRODUCTION AND SALE OF ROCK AND CLAY PRODUCTS.

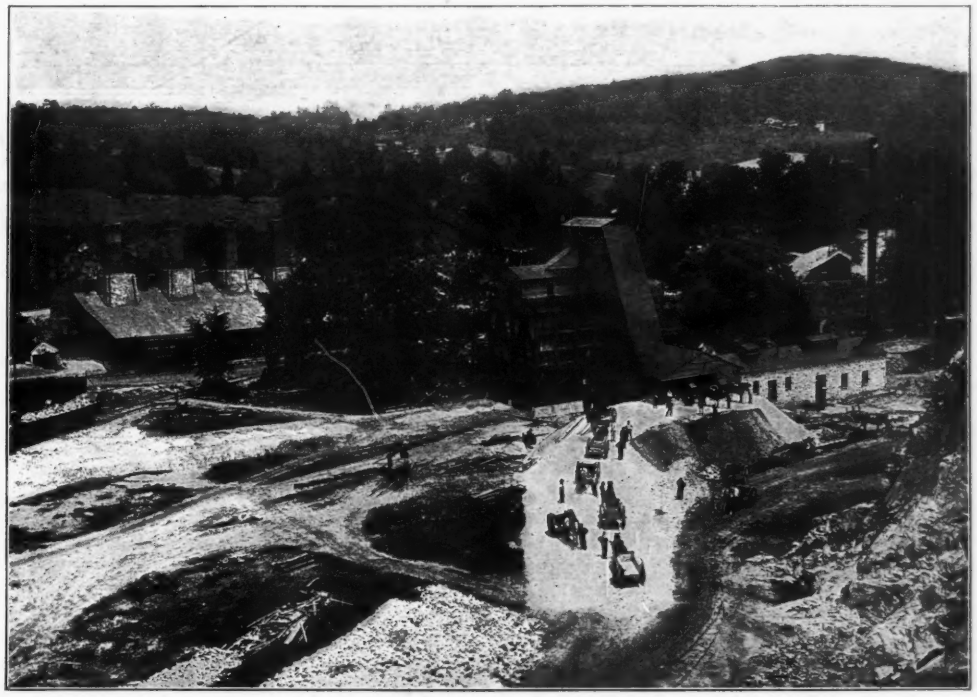
Vol. 1. LOUISVILLE, KY., OCTOBER, 1902. No. 7.

A Historic Lime Industry.

If you were to undertake to trace back the history of the lime industry to the day when limestone was first calcined to produce the lime for the use of masons, etc., you would find that not only was the lime kiln well known in Shakespeare's time, but on back into the mystic ages where history is obscured for lack of detailed records—just when, where and by whom it originated seems to be buried among the ruins of the ancients. It is not a lost art, but we have lost sight of its originator. In fact, very little seems to have been written about the history of the lime industry, which is somewhat strange in the light of its present magnitude. In the pioneer days of most American settlements small kilns of lime were burnt by farmers to supply the modest needs of the neighborhood, and no thought seems to have been given to expanding the industry beyond the local requirements. This is but natural, considering the poor facilities for transportation of the pioneer days, together with the perishable qualities of lime.

Some of those early American lime industries, however, have been continued and developed by time and progress into the modern lime industries of to-day, and thus form a link connecting the industry with the early history of this country.

We have before us a little book called "The Story of Cedar Hollow," printed by the Chas. Warner Co., Wilmington, Del., which brings us in particularly close association with the early history of America. Cedar Hollow, the location from which the lime derives its name, is located in the Eastern section of Chester County, Pa., about three miles from Valley Forge, and this locality is not only an old and famous lime section, but seems to be the cradle of the lime industry of the United States. It was here that the lime was made that formed the mortar for many of the early historical buildings including Washington's headquarters at Valley Forge during the memorable winter of 1777-1778, and of the oldest buildings in Philadelphia and vicinity.



STONE CRUSHING PLANT AND EAST KILNS OF THE CEDAR HOLLOW LIME WORKS.

The limestone in that section seems to have been of a peculiarly desirable quality, and people from the surrounding country came there to buy lime and erect kilns until the location became famous even in those early days of poor transportation facilities. The only way to transport lime was the cart, and even then, notwithstanding the perishable qualities of the material, it was hauled to every section of Eastern Pennsylvania and near-by States of Maryland, New Jersey and Delaware.

There is some little obscurity surrounding the details of the early operations, but in 1856 several capitalists in Philadelphia awoke to the advantages presented by future business in the industry, and purchased ninety acres of land, on which the kilns and quarries of the several owners and lessees at Cedar Hollow were located, and in order to facilitate a wider development of the industry immediately began the erection of a railroad from the kilns to the Chester Valley R. R., two miles away. They organized themselves into a corporation, under the name of the Cedar Hollow Lime Co., and for forty-two years this company has successfully manufactured lime, continually improving and enlarging the selling territory.

The present management of the company came into possession of the property in 1898, when, by reason of the death of the owner of more than half of the stock and the advanced age of the deceased stockholder's associates, the business was sold, and was bought by the present management, who continued it under the old name. The new management brought new energy and a new idea of enlargement into the business, and bought adjoining property, comprising one hundred and twenty acres, so that at the present time the Cedar Hollow Lime Co. own two hundred and eighteen acres of this excellent limestone deposit.

The first round of improvements and addition to the kilns gave them a capacity of 3,000 bushels of lime a day, but they were not satisfied with this, and later added more kilns of an even later pattern, and these, together with their old kilns, gave them a daily capacity of 3,500 bushels of lime. In the process of improving their plant, they have equipped it with everything modern in the way of machinery for handling and conveying the material. The power is transmitted by electricity, everything, including grinding, conveying, sorting and blasting, being performed by this modern power agent.

They have also equipped a plant for the manufacture of limoid and ground lime, with a capacity of 120 tons a day, which marks a great step in the lime industry. Those who are on the mailing list of the Chas. Warner Co. are now familiar with this limoid product of theirs, which was recently quaintly advertised on a series of mailing cards, which were illustrated with a peculiar people suggestive of Brownies, but were an original creation, called "Limies," and were to be seen at work handling the limoid at the various stages from its manufacture to the laying of the mortar. In the manufacture of this limoid they use what is called the Dodge process.

The great step in the lime industry marked by the introduction of this product is in the elimination of the handicap incident to the perishable quality of lime. However, the purpose and ultimate aim of the story, or rather sketch, is to present to the public views and a brief description of the historic lime industry.

(Continued on page 9.)

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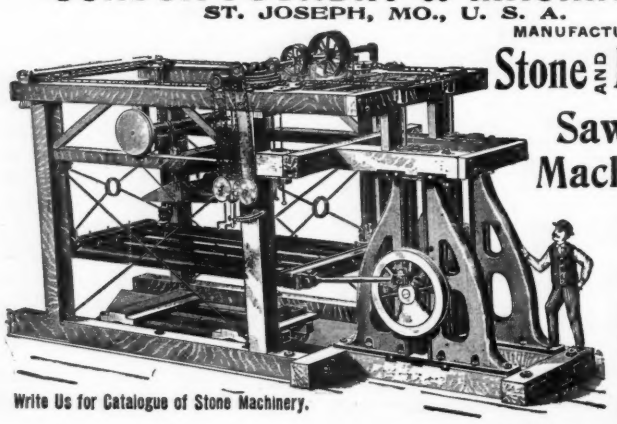

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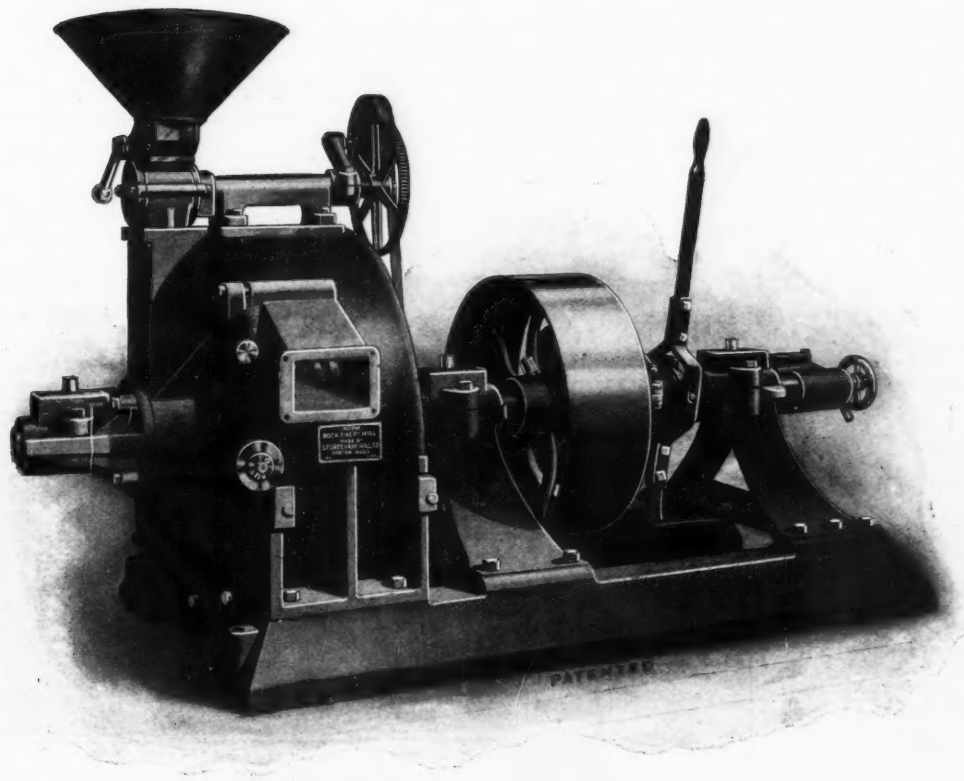

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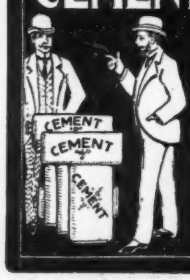

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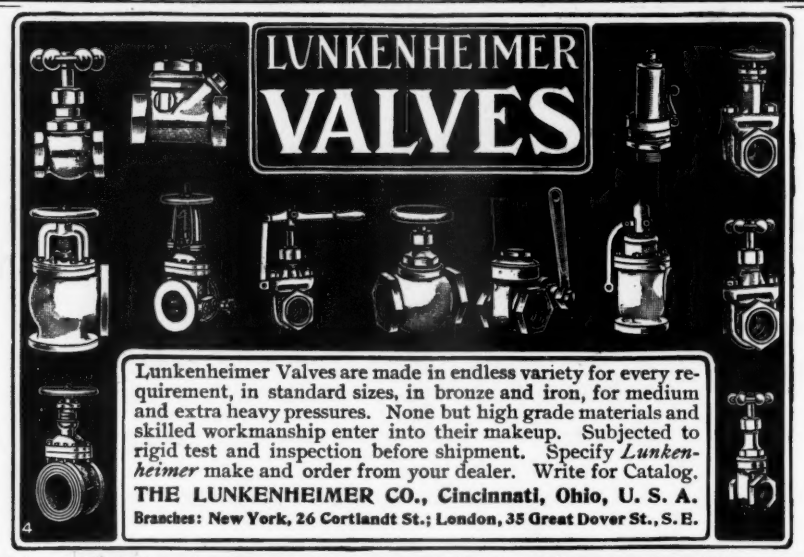

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The mission of ROCK PRODUCTS is to serve the trade in any and every honorable way possible, to promote better profits and make life more pleasant for those engaged in the business to which it caters. With this end in view, criticism is courted, and all are invited to use its columns to further ideas and suggestions for the good of the trade. The office, too, is at the service of the constituents of this paper; so when you want to buy or sell, or merely ask a question, write, and when you are in town, call and make it your headquarters.

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LOUISVILLE, KY., OCTOBER, 1902.

OUR SLATE.

ASSOCIATE.

Association is the order of the day, and the industry without a national association is behind the times.

AN item in a current issue of one of our English exchanges states that a town councilman of England attempted some bricklaying himself, laying 1,000 bricks in some houses he was building, and that he finished the work in seven hours. This, our English contemporary says, is no criterion for the general bricklayer, who lays 400 bricks a day, but it is decidedly instructive. We would say, "Yes," but if they want to get real instruction they should come over here and watch some American experts laying bricks.

REPORTS from Minneapolis state that paving brick is very scarce up there.

THERE is no denying that asphalt and crushed stone are forging ahead rapidly as street surfacing material.

THE use of clay products is growing in all lines, and terra cotta is climbing rapidly in the ranks of building materials in the large cities.

WE would like to see the stone industry have an exhibit at St. Louis in 1904 that we may all feel proud of, and to that end we invite correspondence and suggestions from the trade.

THE slate people are pushing slate to the front as a structural material to such an extent that you need not be surprised if you soon see it used for purposes you never dreamed of.

WE have a corner in ROCK PRODUCTS set apart for the special use of retail dealers in building material, and any and every man in this line is invited to use it for the exchange of ideas.

WITH an increased use of crushed stone on country roads and for street making, together with the increased call for concrete and artificial stone, it looks like the waste problem at the quarry will solve itself.

IF a threat to use concrete instead of brick in a case of bricklayers striking has the effect of causing an early settlement of the strike, there is a chance for concrete to be used to advantage whether it is used or not.

A RECENT mention on this page of rock wool manufacturing brought several inquiries for information on this subject, in response to which we print this month a description of the process. It is rather simple, but none the less interesting—read it.

WE want to say this to the cement trade: Don't, whatever you do, don't adulterate your product. We do not believe that it is often done, nor do we believe there is any but the exceptional man in the industry who will do so under the pressure of the present state of affairs, but we want to emphasize the importance of keeping up the quality of American cement.

WE all understand that it requires a proper raw material to make Portland cement, but judging from the correspondence coming to this office, the world at large is still under the impression that the raw material is the main problem of starting a cement industry, and this is a wrong idea. A more important question just now is that of supply and demand—and the cost of equipping and operating a plant.

It is officially announced by the Western Traffic Association that granite is to have a little better rating. The granite mostly affected in this matter seems to be that from St. Cloud, Minn., especially where it has hitherto been classed as third class. Under the new ruling, the classification to all points west of Chicago will be in the fourth class, with a consequent reduction per 100 pounds in carload shipments. This, it is said, will put the Minnesota quarries on an equal basis with Eastern quarries to all points west of Chicago. Hitherto it has been possible to ship granite from Vermont to Chicago and other points in that section at a lower rate than from Minnesota granite quarrying points, less than half the distance. The Great Northern and Northern Pacific companies made a similar change in classification on shipments from St. Cloud to the Twin Cities several months ago.

THE phosphate market is quiet, but prices are very fair it seems, because the producers realize that it is essential to get a little better price to make a profit in the business. Reports from abroad state that there is beginning to be new life over there, and that several more or less important purchases have been made for 1902-1903 at somewhat higher prices. Buyers, however, are still contending for lower prices, while sellers decline to longer sell at losing figures, so that trade is really rather slow. There seems to be an active desire from abroad to place orders for 1904, but, of course, they want the very lowest prices. Foreign papers, however, are pointing out that a good harvest year in the United States can not fail to exercise an influence on the phosphate trade in several ways. It is pointed out in the first place that freights will naturally advance in consequence of crop movements, and also there will be a larger demand in the United States for super-phosphates. The consumption of phosphoric acid has increased quite extensively in the United States, and as the use of this material grows here, the consequence will be that there will be less phosphates to go to Europe.

IT SEEMS from the report of our Chicago correspondent that the problem of discoloration of brick walls is troubling the brick men at that point right now. According to the best authorities on the subject of the white coating that forms on brick, it may be due to a number of clay impurities. Magnesium sulphate or epsom salts when present in the clay will form a coating on walls where exposed to the weather, as will also alum. Soluble alkaline salts are frequently present in clays, and this may give considerable trouble, because unless decomposed in burning, or rendered insoluble in some other way, they form an unsightly white coating on the surface after burning. The crust may also interfere with the salt glazing by preventing the union of the sodium vapors and the silica of the clay, or preventing the sodium from adhering to pottery that is glazed before burning. Also pyrite and sulphate of iron is present in a great many clays, especially stoneware and fire clays and this alters under the influence of water or fire to sulphide of iron which is soluble in water and may directly or indirectly act as a discoloration provided the ware is not burned to vitrification.

WE would like to impress on the trade the importance of knowing the cost of production in all details. It doesn't matter whether it is producing lime or cement, digging clay or carving stone, one of the first essentials to intelligent business is positive knowledge in detail of the cost of production. This making a guess or a rough estimate, and then running along at that till the end-of-the-year balance shows whether you guessed right or not, would do very well in old days, but it is out of date now. You want positive knowledge as you go along, so that you know when you are selling at a loss. Have you a system for doing this? If so, we would be glad to have you tell us about it, and then maybe some other man, who has a different way, will tell us how he does it—and then somebody will certainly get some pointers about costs. The point to it all, where it benefits all the trade, is in the fact that some men seem to sell below cost in some instances, not knowing what the actual costs are and when such are properly educated in figuring costs they are not likely to again make such low prices. Educate a man on the cost of production, the profit he ought to have, and other business methods, and he is a much better competitor than when he is going along blindly quoting a little below you on the ground that you are quoting for a profit and he can afford to get along with a little less profit.

For the Retailer.

The Interstate Builders' Supply Association.

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Some Seasonable Advice.

As I grow older, and, let us hope, wiser, I become more and more impressed with the value of promptness as a business asset, and I have felt several times of late as if I would like to preach a short sermon on the subject of promptness. I sat in a retailer's office the other day talking with the proprietor, and several times during our little confab he was called to the telephone. As I could hear his part of the conversation I soon became aware that he was explaining to some customer why certain material had not been delivered—and he promised to hurry the matter up as much as possible.

Promptness as a Business Asset.

Now this man may simply have had more calls for material than he could meet promptly, for such things do happen, but the conversation recalled to my mind the reputation of a certain other dealer I knew. This dealer had established a reputation of always delivering the goods sold promptly at the time specified, and he seemed to be always prepared in addition to take care of rush orders with promptness that left a pleasing effect on the customer that was in a great hurry. And, do you know I think that reputation for promptness made him more money than anything else—was, in fact, his most valuable business asset? I have heard his customers talk to each other, and the tone of their comments always were, that he was a little bit higher in his prices than others, but you could always depend on him, and could always get what you wanted. Do you see how he gained? He not only got more trade than any other dealer in those parts, and got it easier, but was able to command a better price for his goods. Just take that idea and digest it, and then see if you don't think it will pay you to put it into practice.

Establish a Reputation for Three Things.

Establish a reputation for three things and you are in good shape to make money out of your business. These three things are, promptness, quality of goods and having a variety of goods on hand. Some dealers, from having continual wrangles with their customers about prices finally drift into the habit of thinking that price is about the only consideration in the minds of their customers, but this is a mistake, and you are likely to find it out if you give in to such an impression and take to making a specialty of keeping only low-price goods. It seems to be a sort of second nature for buyers to seek bargains—we all do it when we go out to buy something—but this does not imply that he wants an inferior article. There are some who will take an inferior article to save a little in cost, but such are in the minority, and the wrangle about prices generally arises from nothing but an inherent desire to get things a little cheaper than the other fellow. With the majority of customers, all you have to do is to establish a reputation for quality of goods, when though they may grumble at you, they will buy your goods right along. There may be some few that won't, but the most desirable customers will, and when you get the bulk of that class of customers you have the cream of the business.

Do Not Sacrifice Quality for Price.

There are some men, men that are classed as good customers, too, who seem to have a set rule of not buying without a concession in some shape, and such men call for individual study, for no rule can be laid down that will fit two of them, and the only thing you can do is to study them individually and treat them accordingly. Then there are times when some man will want a cheap article, though it may be inferior, for some purpose in which it will answer just as well as first-class material. It is a part of your duty to keep in touch with requirements of this kind, and carry the stock to fill the bill, but you should never get the cheap idea in your mind to such an extent that it will induce you to carry a general line of cheap and inferior goods. This point is especially worthy of note right now in connection with cement. Cement prices have been soaring a little the past summer. The manufacturers have not gained so much by it, for the bulk of their output was contracted before the rise. Now, however, when contracting time comes around again, the manufacturers will naturally want higher prices—and what are you going to do about it? Whatever you do, I want to say this, don't take an inferior or adulterated article for the sake of saving a little in the price. If you have a reputation of handling good stock you can not afford to ruin it by substituting an inferior article even though the inferior goods were to be had without price, and if you have not such a reputation, you certainly need it, and the only way to get it is by handling the best goods to be had.

How to Create Demand.

The next thing to quality is variety, and to be known as keeping in stock a great variety of goods, is worth more to you than you imagine. What I mean by this is that you should not only keep all lines of goods that are regularly called for, but should bring out new things from time to time—get the people to looking to you for the latest ideas, and all that. This is a subject that has been threshed over before, but it is good yet. I see it up again among the lumber people, and I want to quote the following from the *St. Louis Lumberman* because it fits right in here:

"The way to have a call for a thing is to supply the thing. There is no call among fishes for a hook with a worm on it, but they will take it when it is offered.

"The supply creates the demand.

"Every dealer ought to paste that in his hat. Some know it and profit thereby, but on the other hand is the fellow who never starts anything. He keeps only such things as have been called for and used for years and shuns everything new. After a while he wakes up to find that his competitor is having a run on a new thing, and then he drops into the rear of the procession, where he stays, for the competitor has the trade started, he keeps it. The man who lives in a small town, when he wants to buy a suit of clothes, usually will go to the nearest city. The same with the woman who wants a new dress or hat. Not because they can buy so much cheaper than at home, but because they find better stock to select from. The day of the little general store is about gone, except in places quite a distance from larger towns and cities."

Get a Full Line of Catalogues.

What I want to suggest along this line is that retailers write to the manufacturers in the different lines of building material for catalogues and circulars, and with these before him figure out what he thinks will "take" in his territory, and then test his judgment by laying in a stock—and making the fact known to his customers. Take slate, plaster, roofing and various other lines, and there may be things made to-day that even the average dealers does not know of, and it won't hurt to get posted, whether you buy or not. Find out what is new and valuable, and establish a reputation for keeping these things, and the trade will not only look to you for ideas, but will buy your goods.

C. R. O.

NOTE.—Dealers who desire catalogues and circulars from manufacturers of building material, and are without names and addresses covering all the lines desired, may address such inquiries to ROCK PRODUCTS and we will take pleasure in putting them in communication with the proper parties.—[ED.

Letters From the Trade

SYRACUSE.

SYRACUSE, N. Y., September, 19.—The Central New York Pottery Co. has been formed with a capital stock of $60,000.00 by Herman Bartels, Jr., Alfred A. Howlett, of this city, and Francis H. Gates, of Chittenango, to take the pottery plant in Chittenango, formerly owned by Frank A. Peck and others. The plant was sold at foreclosure sale to Frank H. Gates, of Chittenango, who held the first mortgage on the property. The plant will be improved and enlarged by the new company. To build and equip it costs in the neighborhood of $70,000.00, and it is comparatively new and in good running order. It is expected that the new company will have it running within two months.

Henry L. Bassett, deputy superintendent of the Onondaga County Salt Springs, said to-day that this far this season the production of salt is only about one quarter of the usual crop, the reduced production being due to unfavorable weather conditions. All of the coarse salt made here is produced by solar evaporation and it requires a large amount of sun, while this season there has been too much rain. The duty which the State receives from the salt manufacturers for the privelege of using the brine will this season amount to only $7,000.00, while last year it was $26,100.93. The demand for salt is good and the prices have been fair.

Edward I. Rice is having surveys made on the marsh land west of the city for a coal trestle and yard to cost $50,000.00. It will be the most complete coal yard in the city. The site contains four and one-half acres. Mr. Rice has recently bought the Dorwin sand beds and quarries and will carry in his coal yard a large amount of sand for the immediate supply of the city demand. Mr. Rice's investment has proven a profitable one, as he is selling large quantities of Dorwin Spring sand. He has by judicious advertising worked up a large trade in sand among people who want a pile of it in their back yards for the children to play in.

The Union Talc Co. of Gouveneur, is making arrangements to open a large talc mill in Gouveneur. The company hopes to have a portion of its machinery in operation by January 1. The capacity of the mill will be 100 tons a day. The plant will be run by 600 h. p. motors. The Union company is one of the largest in the country and already owns the American, Columbia and Wight talc mines, as well as the American, Columbia and Kellar talc mills. The company intends to develop its interests that it can take care of the enormous demand for its product. The company intends to build a trolley road between Fullerville and the St. Lawrence River to get its material away from the mills.

George H. Matteson, of this city, has been appointed temporary receiver of the Independent Paint and Roofing Co., of this city. The company was capitalized at $25,000.00, of which $8,000.00 has been issued. It has not paid from its inception. It has bills outstanding amounting to $1,245.18. Its assets are $895.00.

Plans are being prepared by an architect for important additions to the plant of the Onondaga Pottery Co., in the West End, and several thousand dollars will be spent. The part of the plant built last will be extended to the street. This will be 125 ft. long and 30 ft. deep of brick and stone. The decorative department will be enlarged by the addition of two stories. The original plant was duplicated three years ago. These improvements testify to the immense business the company is doing. It is recognized as one of the leading concerns in the city.

The New York State Fair, which is held in this city every year, was a great success this year. During the exposition, which lasted one week, the Chamber of Commerce and the Merchants' and Manufacturers' Association ran a trade excursion, which brought hundreds of buyers to the city. One of the firms which reaped profit from the scheme is the Syracuse Stoneware Co. The plan was to pay the fare one way of every buyer who purchased $100.00 worth of goods, and to pay the fare both

ways if the customer bought $200.00 worth. Every firm which went into the agreement was well rewarded. The Syracuse Stoneware Co. sent out to all of its customers a special invitation to come and make their place headquarters during the fair. This is the third trade excursion and each has proved more profitable than the one preceding.

C. & L. Merrick have an order for 600,000 bricks to be used in the construction of new railroad buildings in Oswego and Watertown. These and other orders will make business at their brick plant unusually active.

Duane Millen, of this city, and his father, Thomas Millen, who own and operate a Portland cement plant at Wayland, N. Y., and Charles Lockard, manager of the Portland cement works at Warners, attended the meeting of the cement manufacturers of New York, New Jersey and Pennsylvania, which was held in New York a short time ago. Mr. Millen said upon his return that the object of the meeting was to form a permanent organization to protect the general interests of the business. He declared that it did not take the form of a trust and will be known merely as an association of cement manufacturers doing business in the States represented. He said that the manufacturers reported a satisfactory condition of trade.

Stearns & Sons report that the stone, slate and iron men are very slow in making shipments. Business is good in tiles and mantels. Mr. Stearns has been asked to go into a mantel combine, but prefers to be independent.

George W. Pack & Son are making a large number of common brick at the plant just outside of the city limits. They report that the sale of cement and lime are very large.

CHICAGO.

CHICAGO, ILL., September 23.—Building operations in Chicago continue on a large scale, in keeping with what other leading cities in the country are doing in the same line, but the total for Chicago for the month of August shows a decrease of 12 per cent. Some other cities show tremendous gains—for instance, San Francisco shows a gain of 163 per cent.; St. Louis, 54 per cent., and New Orleans 30 per cent. Notwithstanding the decrease in Chicago for August the prospects for an increase during the fall months was never better for the brickmakers and the owners of the great stone quarries. This, too, adds a prosperous season for the limemakers, and while prices for the latter material are somewhat disturbed by the labor unions it is thought all present troubles over the labor question, which has proved a disturbing element among the trade, will reach a satisfactory solution within a few days.

The market for stone in Chicago is generally a good one, and its employment in the construction of buildings is steadily on the increase in this city where buildings of large pretensions are required, as also in the construction of many private residences. There is a continued large demand for crushed stone, which enters so largely in foundation construction, sidewalks and roadways. One large firm here seems to have almost a monopoly in this particular line of business, and its business in this single line is very large. The great demand for stone crushers during the past year has been largely in excess of that of any previous year, taxing the manufacturers to the utmost to fill orders for these ponderous machines from all parts of the country. The advent of the automobile is likely to become a powerful factor in the rebuilding of many of our leading highways, and it is proving a faithful coadjutator to the makers of crushed stone, as well as to those who handle asphalt.

The R. F. Conway Co., of this city, has just been awarded the contract for paving West Lake Street with granite—a large job.

The cement industry in this country has made wonderful strides within the past few years, and new cement manufacturing plants have started up in many sections. The Allis-Chalmers Co. have recently received large orders for cement machinery, and are rushed to fill orders for this class of work. Louisville cement has always been received with favor in the Chicago market, and was largely called for and used here at a time when many of our great public works were scarcely thought of. It has always held a high place in the estimation of builders whose experience has led them to know what a good cement really is, and its true value in the construction of important public improvements. Cement dealers say that we are making cement in this country equal to that made in England, and of a better quality than that imported from Germany. Complaints are made that a good deal of this foreign stuff is adulterated, and is of a really inferior quality. The charge of adultered cement, however, some dealers are frank enough to admit, does not rest solely with the imported varieties, but certain makers of home cement have impaired the value of their own goods, by resorting to similar methods. Not many years ago British cement enjoyed almost a complete monopoly of the importations into this country, now it is only nominal, due to the fact that the manufacturers failed to produce a finer article until the trade had passed out of their hands. In cement it will pay any manufacturers to make a good article and keep it up to the highest standard possible. Up to May, of the present year, we imported into this country 2,108,388 barrels of cement, only 199,633 barrels of which were from the United Kingdom, while Germany alone sent up 1,198,822 barrels. At the present rate of enlargement in our cement industries it will not be long before we shall be independent of any foreign cement.

The bricklayers of Chicago being on a strike, and the danger of further delay in the construction of the great intercepting sewer being presented it is said that our Commissioner of Public Works, Blocki, has in view the use of cement instead of brick, to hasten their completion. Cement is now being used entirely in the construction of sewers through the freight yards at Clearing, generally known as the Stickney Live Stock Yards, and it is said with excellent results. The great tunnels, forty feet below the surface of the city, of the Illinois Telephone and Telegraph Co. use cement, it giving the best possible satisfaction. The threat of the commissioner to discard the use of brick and resort to cement in completing the intercepting sewers stirred up the brick men, and should this decision of the commissioner be carried out, there will be a largely increased demand for cement. However, most, if not all, the brick that will be required has already been contracted for.

QUINCY.

QUINCY, MASS., September 24.—Trade continues good in the staple industry of the city, and an excellent winter business is anticipated. Every yard has its complement of men at work and the quarry owners are fast overcoming the stock shortage. Heretofore want of the essential in the manufacturing district has been a serious bane to the trade. Orders for rough stock accumulated, but by an extra effort the quarry owners are fast filling same, so that in a short time the order and delivery of the quarry output will attain its normal condition. This in itself is a boon to the trade, as finished work has been seriously retarded, chiefly for the delay in the delivery of rough granite.

The Quincy Granite Quarries Co. is to be reorganized and it is proposed to form a new corporation under the laws of the State of New York, to be called the Quincy Granite Co., to provide for extensive improvements to the properties, including a modern power plant, and to furnish working capital to finance large contracts for material. The new company will have a capital of $1,000,000.00 common stock, $1,000,000.00 7 per cent. preferred stock, and $1,000,000.00 6 per cent. 20-year mortgage bonds. Present bondholders are entitled to receive for each $1,000.00 bond $500.00 in new bonds, $250.00 in new preferred, and $250.00 in new common, and cash for the interest due September 1, 1902. Present stock is entitled to receive $100.00 in new preferred stock in exchange for each four shares of present stock. The present company has $800,000.00 mortgage 5s, $1,750,000.00 stock and $200,000.00 floating debt.

John Fallon & Sons have been awarded the contract for providing 18,000 tons of rough granite to be used in constructing the ripraps around Nut Island. The work will be done in connection with the completion of the Metropolitan Sewerage System, whose outlet is at this point. The stock for the construction of this breakwater, which will skirt the entire island, must be delivered prior to December 1, 1902.

George Prout & Son will move their entire manufacturing plant from its present location, Clark Avenue, to the sheds formerly occupied by the defunct firm of Craig & Richards, near the Quincy Adams depot.

The Quincy Granite Quarries Co. is making a specialty of filling orders for medium stock, within two weeks from the date of receipt of order. The manufacturers have already shown their appreciation for such prompt delivery. The same company is furnishing stock for the completion of the following building enterprises: the abutments for the new Fore River bridge, the cut trimmings for the new mammoth round house to be erected in the Boston yards of the New York, New Haven and Hartford Railroad, the granite used for the construction of coal pockets for the Boston terminus of same company, and the underpinning and trimmings for the new plant of the Sturtevant Blower Works, located at Readville, Massachusetts.

Following is a partial list of out of town dealers to visit the trade during the month passed: W. Peverley, of Peverley Bros., Philadelphia, Pa.; Mr. Hagner, of Wolfe & Hagner, Appleton, Wis.; J. C. Blake, Athol, Mass.; Mr. Fox, of Fox & Becker, Middletown, Conn.; Mr. Mason, of the Mason Monumental Works, Columbus, Ohio; A. J. Poutas, Waltham, Mass., and Mr. Eisenbrown, of Eisenbrown & Co., Reading, Pa., and Mr. Nickerson, Hyamis, Mass.

The amount of granite shipped by rail from this city during August was 10,959,636 pounds, distributed from the several terminals as follows: Quincy Adams, 4,473,091 pounds; West Quincy, 4,276,435 pounds; Quarry Railroad, 2,210,110 pounds.

Trade Is Good.

Cooper Bros., Props. Raleigh Marble Works, Raleigh, N. C.—Trade is good; better than ever before, with good prospects for fall and winter trade.

A Correction.

Hughes Granite and Marble Co., Clyde, Ohio—In mentioning our contract for the Vicksburg monumental work, your informers or reporters were not very accurate in giving you the amount of the contract price, which was $49,000.00, instead of nearly $40,000.00, as you had it.

We Are Very Sorry.

Texas White Brick Co., Paris, Texas.—You made quite a bull in your September issue in giving a notice of our organization. We are incorporated under the laws of the State of Texas, with a capital stock of $50,000.00. The incorporators are: H. S. Bettes, J. J. Dickerson, G. F. Hicks, W. R. Eubank, D. H. Scott and J. J. Baldwin.

Wants Discussion on "Costs."

American Slate Co., East Bangor, Pa.—We note on the editorial slate of your paper for September, the query, "Cost—are you getting it all in in figuring the cost of production?" This is a vital question, to which we have given special attention, organizing a system, which, I think, will enable our company to tell the cost of the various grades of rock products from our mines. It would be interesting to have a discussion or expression from your readers on this subject. C. R. LIPPMAN,
Ass. to Pres.

Are Getting in Shape for Work.

The American Sandstone Brick Machinery Co., Saginaw, Mich.—We have been bothered about getting our machinery and material which we require to equip our factory. We have our building completed, and will commence installing early next week, and will have our factory in operation and expect to make sandstone brick before October 1. We are putting up building, power plant, etc., of a 40,000 capacity a day of ten hours, but will start up with one press and hardening kettles, with which to make from 10,000 to 12,000 bricks a day, and will put in additional machinery as the trade warrants.

Fertilizer Outlook Good.

Southern States Phosphate and Fertilizer Co., Augusta, Ga.—The new fertilizer law, which goes into effect October 1, will have very little effect on business, as the principal change in it is the different manner of printing the bags. Instead of printing the percentage of ammonia on the bags, the new law requires the percentage of nitrogen to be printed. There are some minor changes as to what grade of goods can be sold in the State. In regard to the business outlook, it seems to us very bright, and we expect to see a heavy demand for fertilizers another season. The prevailing prices for cotton should enable the farmers to meet their obligations and be in fairly good condition for another year's work.

Our Travelers.

The Way Things Seem to a Newspaper Man When He is Out Among the Trade.

AROUND JOLIET.

Notes and Views of the Stone Industry in Cook County, Illinois, During a Summer Trip.

The city of Chicago, with the constant struggle for improvement, and its ceaseless change in the building, repair and improvement of streets, construction of building foundations and heavy masonry in stone and concrete, elevation or railroad tracks, ballasting of railroads and the erecting of large buildings, calls each year for an immense amount of stone of every sort. Those quarries with on account of their nearness to the city, and, consequently, cheapness with which the stone may be transported to the city, contributes largely to the work.

AMONG THE LIMESTONE QUARRIES.

Of the many quarries that have for a long time contributed are those at Joliet, Cook County, Illinois. These quarries also send stone to Michigan, Wisconsin, Indiana and Iowa and points in Illinois where the freight rates do not exceed the amount for which the stone can be sold. The quarries at Joliet are mostly about two miles from the village. The stone is fine-grained magnesian limestone, and when first quarried is soft and of a grayish white color, which, upon exposure to the weather, hardens and in the sunlight tans to a light yellow, which on continued exposure becomes quite a dark buff. The color is due to a small quantity of iron contained in the stone, which by exposure to the air oxidizes. The entire deposit is in horizontal beds, and the quarries are worked to a depth of 20 to 25 ft. The stripping at this deposit is not very heavy, the top earth being full or granite pebbles and boulders, showing evidences of the glacial period. The top layers of the stone are much broken by seams of clay and sometimes so highly discolored by oxidation, occasioned by the trickling through the seams of the water containing carbonic acid gas which acts upon the small amount of iron in the stone, that they are unfit for use. In other cases, however,

TAKING OFF THE FIRST LAYER OF STONE—WESTERN STONE CO.

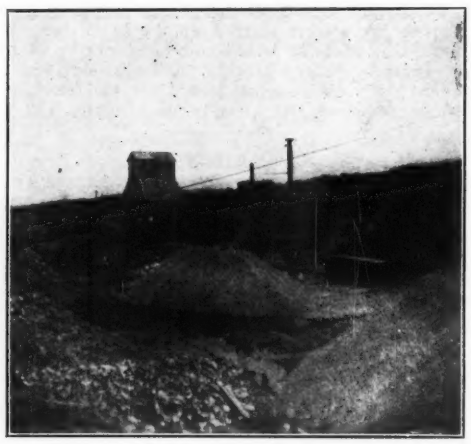
much of the top stone can be broken for rubble and riprap, or can be crushed.

The quarrying is easily done by means of tripod steam drills and the plug and feather, the top pieces of stone splitting off from the under and leaving an almost smooth surface for the under floor. Most of the quarries in this section have an open face and but little use is made of channelers. The layers are from three to twelve and fourteen inches in thickness, and obtainable in almost any length and width. These latter dimensions are, however, somewhat limited by vertical seams of flint stone and clay, or the faulting of the rock which makes the different layers uneven on the floor of the quarry.

Often between the layers of good stone or "tame stone" is found a layer of stone that does not separate easily from the layer below, and is very flinty, hard to work and not the homogeneous stone of the other layers. This, when taken off, is put on the waste heaps or sent to the crusher.

WHERE THEY USE FIFTY-POUND HAMMERS.

There is also what is known as the five-foot layer of *wild stone*, or stone in which there is no decided grain and splits in no general direction. This is also full of flint, and also contains fossils shells, small pockets containing crystals of calcite and crystals of various iron in compounds. This wild stone, when the quarrymen come to it, is drilled, the drill holes charged with powder, connected and exploded by electricity. The large blocks that are gotten out in this way are broken by hand labor into pieces that may be used for rubble, riprap or break-water, or if not desired for this, are, as is the case with the Western Stone Co., taken to the crusher, and with other quarries thrown on the waste pile. The hammers used by the men in breaking this stone are usually about twenty to twenty-five pounds in weight, but some fifty-pound hammers are also used, with very good effect. It was claimed that the stone was more easily broken with the fifty-pound hammers than by those of lesser weight, fewer strokes being required to break the block and also breaking it into more symmetrical pieces, and the men seemed to prefer the heavy hammer in spite of its weight, and handle it with the ease of a croquet



CRUSHING PLANT OF THE WESTERN STONE CO.

mallet. This hammer usually breaks the stone, however thick it may be, in about two strokes, the first stroke marking the stone, and the next splitting it.

THE USERS OF JOLIET STONE.

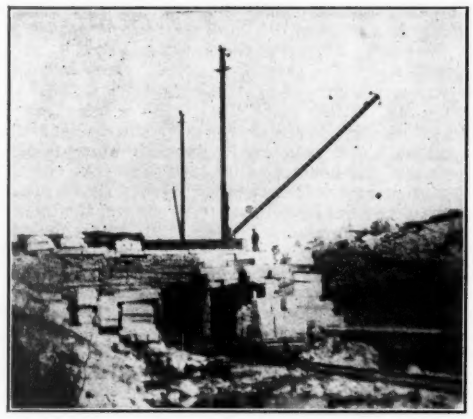
The greater quantity of the marketable Joliet stone is perhaps used for flagging, curbing and cross-walks, but it is also used as a building stone, for the foundations of building, bridge masonry, rubble, riprap, breakwater, crushed stone, copings, sills, steps, etc. In using this stone for building purposes care has to be used both in selecting the stone and in the placing of the stone in the building. On account of its peculiar horizontal cleavage the stone can only be used on bed. If used on edge it is very apt to scale off, even though no marks of lamination are visible in the stone. The color of the stone, although it does not affect the value—as related to weathering qualities or strength—is sometimes counted against the stone. This is, however, a matter of taste or fashion in the building materials, but contractors often reject the colored stone even when used for ballast, rubble, breakwater, or foundation stone, where it will not be seen. Even when used on bed, caution has to be observed and pieces selected which show no signs of lamination, for these lines, if exposed to the weather, are apt to be split open by water entering and freezing and thereby rendering the stone unsightly as well as unsafe; also pieces have to be taken, when they are to be used exposed to the weather, of uniform color when quarried as, although no signs of lamination may be visible between the slightly brown water-colored stone and the light gray freshly exposed stone, it is often apt to split along the color line .

If, however, the quarryman and quarry superintendent show proper judgment, this Joliet stone is very durable as shown from the large amount used in buildings, flagstone, curbing, concrete, etc., in and around Joliet and Chicago.

THE CRUSHER AS A WASTE-SAVER.

Within the last three years large amounts of stone have been crushed and used for railroad ballast, macadam roads and mixed with cement for concrete, which has come more and more into use for preparing the foundations for large buildings, and foundation and heavy masonry work of all kinds.

Joliet stone has entered into competition with



PILING UP STONE FOR FUTURE ORDERS—WESTERN STONE CO.

other stones for this use with good results and much stone that would otherwise have been wasted is now being crushed. The Western Stone Co. had one crusher in operation at the time of my visit in July, and a considerable amount of crushed stone was piled up ready for shipment. The broken stone was lifted by derricks to the mouth of the crusher and fed in by men. The crusher was a Gage crusher using a rotary screen and separating the stone into four sizes. Complaint was made among most of the quarrymen of the scarcity of cars for transportation.

On account of the ease with which the stone is quarried no very skilled labor is required in these quarries and the quarrymen all have the same wages, $1.75 per day. Most of them are foreigners—Italians.

The quarries of the Western Stone Co., the Joliet Quarries Co., the Globe Stone Co., as represented by Mr. Wm. Douglass, E. Porter & Sons Stone Co., the Joliet Pioneer Stone Co., and a few abandoned quarries are situated near each other, while in other directions from the town are the quarries of the Keltic Stone Co., the Keltic Construction Co., Messrs. Bruce & McCowan, the James Bruce Quarries, Krakar & Sons Stone Co., Messrs. D. & F. Murphy, Mr. Thos. Patterson, the Ross & Curtis Stone Co., Mr. Chas. Werner, and the Zarley Lime and Rubble Stone Co.

These were all in active operation at the time of my visit and very busy getting out stone for contracts; the piles of stone usually made up in the summer ready for use when needed by contracts calling for immediate attention, were not very large, the demand for stone calling for all that could be taken out at the time. It is estimated that the value of the output from the Joliet quarries in 1901 amounted to $350,000.00, and 1902 will without doubt show a larger output. A. C.

Originators of Limalene.

Ossining Lime Co., Ossining, N. Y.—We wish to call your attention to an error in your September issue, which read, "Henry Marks and the Sing Sing Lime Co." There is no such concern in business here, and we are the only lime and quarry company in this town. We inclose you a circular about our particular lime, which we call limalene, and we claim to be the original manufacturers of this material in this country, having started the business in 1888. The circular in part is as follows: "Limalene is a product in flour form resulting from the treating of quick lime by a recently discovered process, which puts the lime in such condition that it will keep for all time, requires no further slacking; will not heat, swell or change; retains the full strength and setting qualities of the lime, and is always ready for immediate use when wet up to a putty. It is put up in bags of 100 pounds. Always works cool, and does away with the trouble and waste there is attending the use of quick lime.

Plaster.

The Rockford Wall Plaster Co., Rockford, Ill., is having a good run of orders and enjoying an era of good business.

It is reported that the United States Gypsum Co., Toledo, Ohio, has added three more plants to its list, making thirty-eight in all.

The plant of the Paragon Plaster and Supply Co., at Bloomsburg, Pa., has been destroyed by fire. The loss is estimated at $10,000.00.

It is said that H. A. Winters and his two sons, Thomas and Charles, and Geo. H. Gaul, of Union City, Mich., own some gypsum property, on which the gypsum is said to be over thirty-five feet thick.

The Greer County Gypsum Plaster Co. has been incorporated at Mangum, Okla., with a capital stock of $200,000.00. The incorporators are: W. E. Whiteside, Blake Lee, S. L. Bryan, S. W. Womack, Greer County; and J. H. Whiteside, Quanah, Tex.

Salina Cement Plaster Co., Lawrence, Kas., has bought the plant of the Blackwell Cement Co., at Blackwell, Okla. Most of the stock of the Blackwell Co. was sold to Wichita men, all of whom have practically sold out to the Salina Cement Plaster Co.

The Southern Wood Fiber Co. has been organized at New Orleans, La., to manufacture wood plaster. The officers of the company are: W. M. Anderson, president; J. C. Hood, secretary and general manager. The contract for the building has been let and the machinery purchased, and the factory will be in operation in a few months.

According to newspaper reports a new gypsum company is being formed to operate in Ohio, in which Chas. C. Winters, of Sandusky, is interested. The report states that a plant will be erected at Crystal Rock, near where a deposit of gypsum was recently discovered, to cost $100,000.00.

The Oklahoma Gypsum Fields.

During the past summer a party, consisting of Prof. C. N. Gould, geologist of the University of Oklahoma, Norman, Okla., some advanced students and others of the institution, spent quite a lot of time surveying the gypsum and salt fields of Oklahoma. In speaking of the trip, Mr. Gould gave out the following interview in regard to his observations:

"The amount of gypsum almost passes belief. In the region visited it lies as immense ledges across the greater part of the country. The ledges are from a few inches to many feet thick. A ledge in Washita County encountered in a wall is said to have a thickness of 115 feet. There are a number of ledges two to twenty feet thick and some of them run for a hundred miles or more across the country. The greater part of this gypsum is hard, massive rock, usually white or pinkish and the ledges may frequently be seen for miles across the plain.

"There are three principal ledges of gypsum in Oklahoma, or perhaps it would be more correct to say three rows of gypsum hills, for it is usually the case that two, three or even more ledges lying one above the other, separated by red clay, make up a hill.

"The first of these are the 'Gyp Hills' proper, extending from the head of the Medicine River in Barber County, Kansas, southwest through Woods and Woodward counties to the Cimarron River, then southwest between the Cimarron and North Canadian, past the Glass Mountains into Blaine County, just touch the southwest corner of Kingfisher and die out just north of El Reno.

"The second ledge lies parallel to the one just described and from thirty to fifty miles farther west. Its northern extremity is in southern Woodward County, near Richmond. It is seen on the hills north of Taloga and extends up the South Cannadian River, well into Day County. It occupies the greater part of Dewey and Custer counties, outcropping all along Deer, Barnitz and Quartermaster creeks. It is found as far up the Washita as Cheyenne. In eastern Washington County it forms immense ledges and extends past Fort Cobb to the hills south of the Washita and outcrops in the region of the Keechi hills in southeastern Caddo County. This is the most extensive ledge in Oklahoma.

"The third ledge extends from the southwestern corner of Washita County, through the southeastern corner of Roger Mills, across the north fork of the Red River into Greer County. It forms Haystack Mountain, outcrops along Haystack, Fish and Bull creeks and Elm fork of the Canadian to the Panhandle line and far into Texas. In the southern part of Greer Country there is a ledge of considerable area which may or may not be the same as one just mentioned.

"It was estimated that the amount of gypsum in sight in the territory would approximate over 100,000,000,000 tons.

"The region of the gypsum deposits are in many instances the most fertile in Oklahoma. Land plaster, which in many States is sold and used as fertilizer, is nothing but gypsum. In Oklahoma nature spreads this fertilizer with lavish hand. Corn, wheat, cotton and fruits grow equally well in gypsum regions, and some of the finest farms in the territory are in these western counties, right among the 'Gyp Hills.'

"Whether or not there are precious metals—gold, silver, etc.—in paying quantities in Oklahoma, remains to be proved. The present indications are that the quantity of such minerals is small. Much time and money have been expended in various parts of the territory in 'prospecting' for valuable minerals. Neither the geological formations, the results of assays, nor the experiences of miners justify the supposition that large amounts will ever be found.

"The deposits of gypsum and salt, however, are inexhaustible. Gypsum products—cement, plaster, stucco, plaster of paris, cold water paint and the like—are coming more and more into prominence. There are now three mills in the territory where these products are manufactured. Others are now being put in. It is stated on good authority that a single company has the contract for supplying 9,000 cars of this material for the St. Louis Fair. Oklahoma should furnish a large amount of this supply. A mill in Texas, not half a dozen miles from the Oklahoma line, ships 700 tons of plaster each week to New York.

"As soon as Oklahoma has mills sufficient to supply the demand, the manufacture of gypsum into cement and plaster bids fair to constitute by far the most important mineral industry in the territory."

The Ozark White Lime Co. has been incorporated with a capital stock of $50,000.00 at Springdale, Ark., by E. C. Pritchard, E. A. Gillett, F. O. Gulley, H. K. Wade and J. W. Stuckey. This company takes over the works, or, in other words, is a consolidation of the Crescent White Lime Co., and the Springdale White Lime Co.

Lime.

F. W. Van Fleet is equipping a lime plant at Carey, Ohio.

The White Marble Lime Co., Mainistique, Mich., is making some chances and improvements in its plant.

T. J. Taylor, Orifino, Ida., has his lime kilns in operation, and reports state that he is turning out the article. At last report he was adding a third kiln to his plant.

The Valley Iron Co. has been incorporated at Chattanooga, Tenn., with a capital stock of $1,000,000.00, by J. G. Batelle, H. A. Marting and others, to develop coal and limestone property in Alabama and Georgia.

The Georgia Lime Works has been incorporated with a capital stock of $10,000.00, at Atlanta, Ga., to manufacture lime. The incorporators are: H. K. Dunning and T. M. Randall, of Atlanta, and D. Van Smith, of Charleston, S. C.

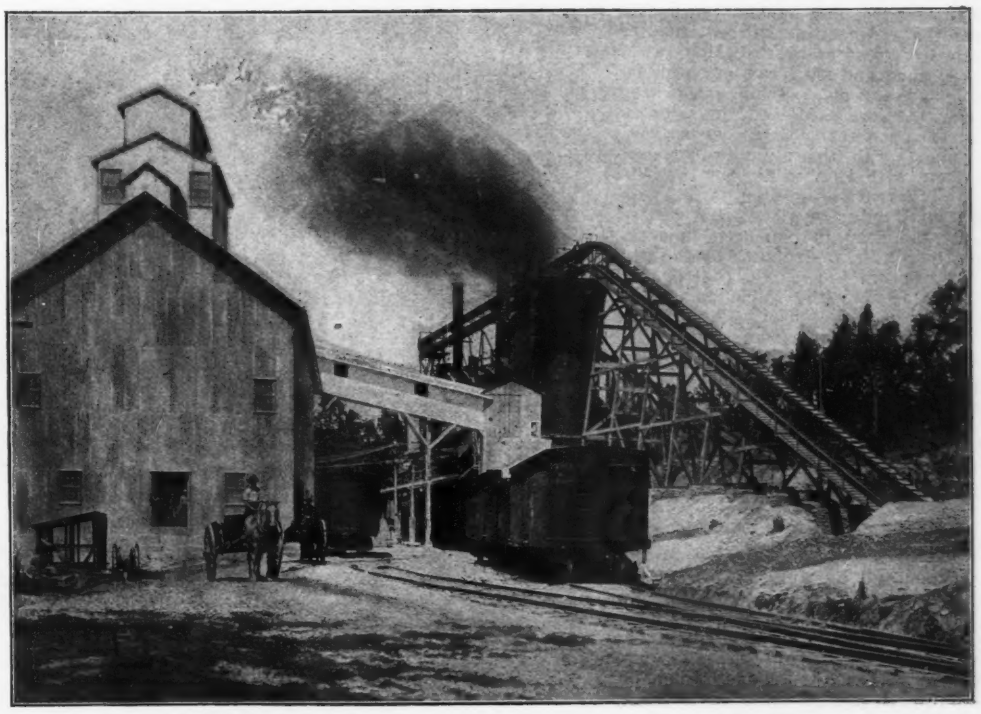
A Historic Lime Industry.

(Continued from page 1.)

In describing this property they say that on the one side, facing the Northeast, is a vein of ninety feet in height and twelve hundred and fifty feet in breadth; while on the other side, facing the Southwest, is a vein of equal height and eleven hundred feet in length. The former vein extends fully three-fourths of a mile to the Southwest, and the latter a quarter of a mile to the Northeast. The top soil covering these veins varies from one to four feet. The supply of stone which they contain, irrespective of the depth to which they can be sunk, is practically inexhaustable.

Samples of this material, submitted to Booth, Garrett & Blair, 406 Locust Street, Philadelphia, Pa., showed on analysis the following constituents:

	"WEST."	"SOUTH."
Silicious Matter	0.82%	0.69%
Oxide of Iron and Alumina	0.41%	0.33%
Carbonate of Lime	53.64%	53.68%
Carbonate of Magnesia	45.44%	46.17%
	100.31%	100.87%



LIMOID PLANT AND WEST KILNS OF CEDAR HOLLOW LIME WORKS.

Cement.

The Portland Cement-Making Process.

In some previous articles I have touched on the subject of factors in cement manufacturing, and in a general way, have outlined the process of making Portland cement, but now we will go over the ground in detail—and maybe in the discussion of details a suggestion will occur to some one that will be of material assistance to the trade.

Raw Material the First Consideration.

The first matter for examination in detail when we go to consider making Portland cement, is the raw material, and it is, in some respects, the most difficult to explain clearly. The chemistry of cement is still something of a mystery, even to our most brilliant scientists, so the ordinary mortal can easily get beyond his depth in an effort to explain the chemical action of the combined material entering into cement. Portland cement is, broadly speaking, formed by burning a mixture of lime, silica and alumina, which has been intimately mixed and finely ground, and then grinding the clinkers to a fine powder again. The product must have the quality of hardening, either in water or air, after being mixed with water, and that either alone or when combined with sand, and should have a gradual increasing strength with age and retain a practically constant volume. Now, it does not matter from what source the raw material comes so far as the cement is concerned, just so you get the proper proportions of the right substances.

Limits in Ingredient Proportions.

Of the proportions of ingredients, Lathbury & Spackman, the well-known engineers and designers of cement plants give the following as marking the practical limits:

	Minimum. Per Cent.	Maximum. Per Cent.
Silica	19	26
Alumina	4	10
Iron	2	5
Lime	58	67
Magnesia	0	5
Sulphuric acid	0	2.5
Alkalies	0	2.8

Three Important Constituents.

It will be readily seen from this that three compounds, lime, silica and alumina form the important ingredients, and other matter that enters into the composition of raw material, generally there by virtue of the fact that raw materials are never pure and they can not well be entirely kept out. Some authorities claim that iron oxide acts the same as alumina, and that cement can as well be made with the alumina replaced entirely with iron oxide, but there is some difference of opinion on this subject, so I will drop it at that before I get too deep in chemistry, merely mentioning it to explain why the two items are sometimes given together, as will be seen by the following, which is given as representative of a high-grade Portland cement analysis:

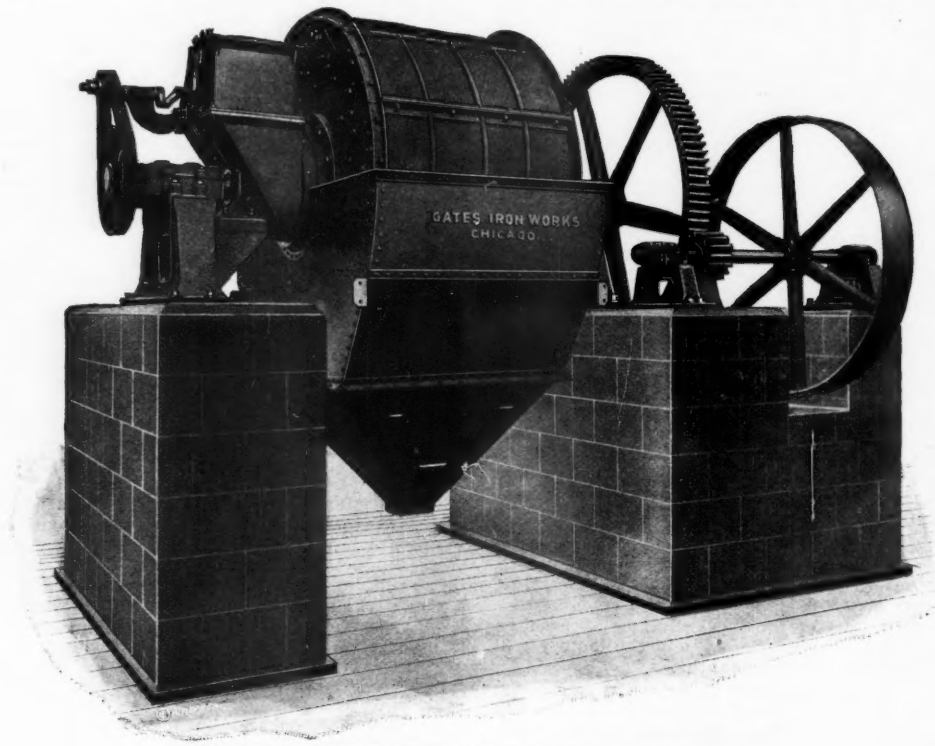
	Per Cent.
Lime	60
Silica	25
Alumina and oxide of iron	12
Magnesia	1
Alkalies	1
Residue, etc	1
	100

Why Should Raw Material be Powdered?

I could go on and write a whole book about different raw materials, results of experiments, etc., but there is some danger of my floundering in too much deep water, besides, you have to get an expert to do some of this talking before building a plant, and I don't want to take their thunder. What I want to talk about is the work involved in converting the raw material into cement. The first step—assuming that we have the argillaceous limestone of Pennsylvania, and the hard compact limestone of that district as a combining agent—is to reduce the material to a powder, and get it thoroughly mixed. Sometimes I think that if a man should ask me why we should reduce the raw material to a powder I would first tell him I didn't know, and then have a spell of thinking to see if there was not some way to cut out part of this grinding. Still, the first explanation of cement specifies that it should be both finely ground and intimately mixed before burning, and there is a reason for it or it would not be so specified. I could point out a few of them, but that would start me off into deep water again, but we can all understand how that by combining the materials before the last stage of the grinding is reached the "intimate mixing" will take care of itself. Sometimes the raw material is mixed at the start, particularly when it is all stone, and sometimes just after passing the crusher, and always, even when clay and limestone are combined, before the final grinding.

The First Step in the Mill.

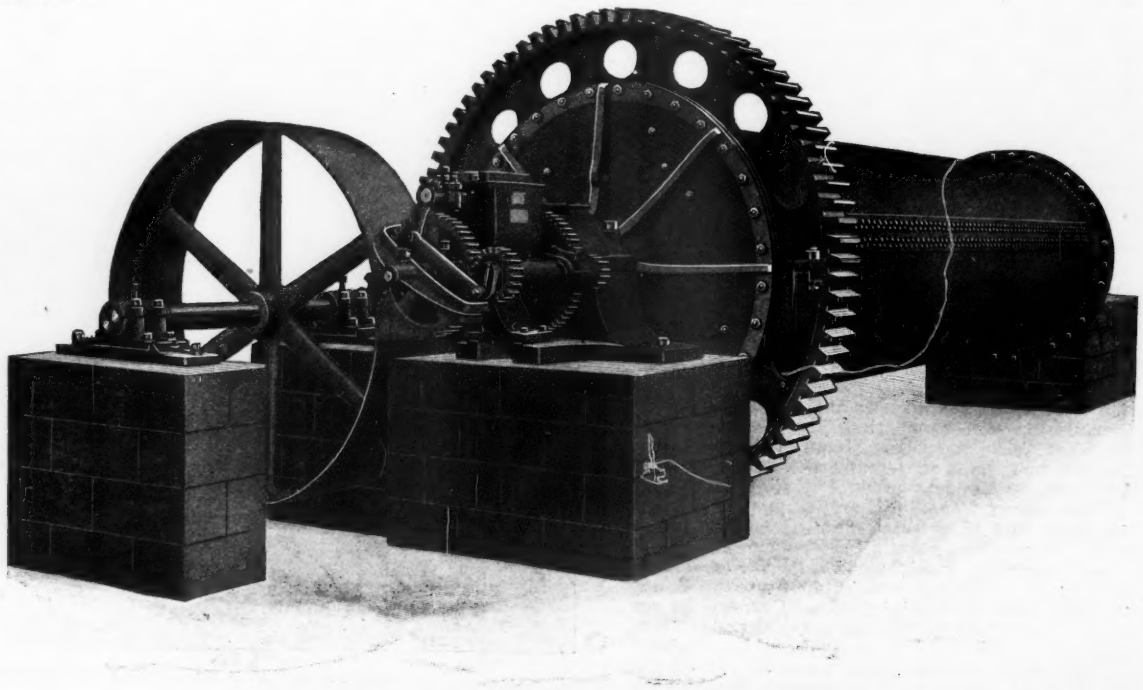
The first step in grinding is through the crusher, and we will pass that along for the present, because almost any man in the stone business is familiar with this work. Then we begin to get mixed up with ball and tube mills and other grinding and pulvering machines till there is some danger of confusion. In the first place the material may be pulverized after the crushing stage by a variety of mills and appliances, but assuming that we follow the general plan of the modern mills in the Lehigh district, the crushed material would go from the crusher to a dryer, usually of the rotary type, and be thoroughly dried before the finer grinding is undertaken.



BALL MILL—MADE BY THE ALLIS-CHALMERS CO., CHICAGO.

The Work of the Ball Mill.

Then the material usually goes to a ball mill. The ball mill consists essentially of a revolving drum, in which are a number of steel balls, and it originated in Germany. It would be rather difficult to give a description of this mill in detail, without something to show the interior view, and as we have no drawing of this kind at present, I will have to pass it along to another time. The ball mill reduces the material until it will pass through the sieve surrounding it, which varies in mesh in different mills, but it may be said to



TUBE MILL—MADE BY THE ALLIS-CHALMERS CO., CHICAGO, ILL.

cover half the ground between the crushed and the finer ground materal.

The Tube Mill and Its Capacity.

From the ball mill the raw material passes to the tube mill for its final grinding. This tube mill consists essentially of an iron cylinder, 4 ft. in diameter and from 20 to 22 ft. long, lined on the inside with hard flint stones and kept about half full of flint pebbles, which pulverize the material as the cylinder revolves. A combination of this kind, consisting of one ball mill and one tube mill of the average size, is ordinarily estimated to grind material for about 400 barrels of cement in a day. This gives us a starting point for figuring the requirements in grinding machinery before the kiln is reached. For example, if we want to manufacture 2,000 barrels of cement we would require five ball mills and five tube mills to handle the raw material.

When the material goes through the tube mill it is ready for burning but usually goes into a storage bin before going to the kiln. The storage bin is made to hold, say, enough for a day's run of a kiln, so that in case of an accident to the drying machinery, the kiln will not have to be stopped.

The Rotary Kiln.

From the storage bin it is taken by conveyors or hoppers which feed the rotary kiln, and this brings us to the burning end of the business. Nearly all the burning, or at least more than 75 per cent of the Portland cement manufactured in the United States to-day, is in rotary kilns. This kiln, as stated in a previous article, is nothing more than a huge steel cylinder usually 5 to 7 ft. in diameter and 60 ft. long and is mounted on roller bearings so it can be slowly rotated while in operation. It is not mounted level, but at an incline, say for an average 15 degrees. The picture of the kiln gives us a very good idea of the mounting and the driving gear without further description. It is lined on the inside with firebrick, and the upper end is encased in a brick housing, which forms the base for a smokestack and also contains a conveying spout for the raw material.

The raw material enters the upper end from the hopper above, usually through a water-jacketed spout or pipe, and works its way slowly down to the lower end by gravity as the kiln revolves. The lower end of the kiln has a hood or door, which is mounted on a truck, so that it can be rolled back from the end of the kiln when occasion requires. This door is simly a circular iron casing, which is filled with firebrick, and through it passes the fuel in the form of powdered coal, driven in by a fan through a pipe.

Where Ignorance Is Not Bliss.

The operation of this kiln looks simple, and in a certain sense it is, but there is a chance not only for ignorance to spoil the cement, but also spoil the profits of the institution by an extravagant use of fuel. In fact, the first efforts of this kiln were failures, and it was only after repeated and persistent experiments that it was brought to the point of success in calcining cement. The physical qualities of the raw material have a direct bearing on the kiln, calling for variations in heat, and also on the hardness of the clinker. Hard limestone, when mixed with clay, makes a material requiring the greatest heat to calcine and also produces the hardest clinker, while marl or chalk combined with clay is more easily burned and makes a comparatively softer clinker. The natural cement rock of the Lehigh district is said to stand between these two materials in refractability, and is in that respect on the middle or average ground.

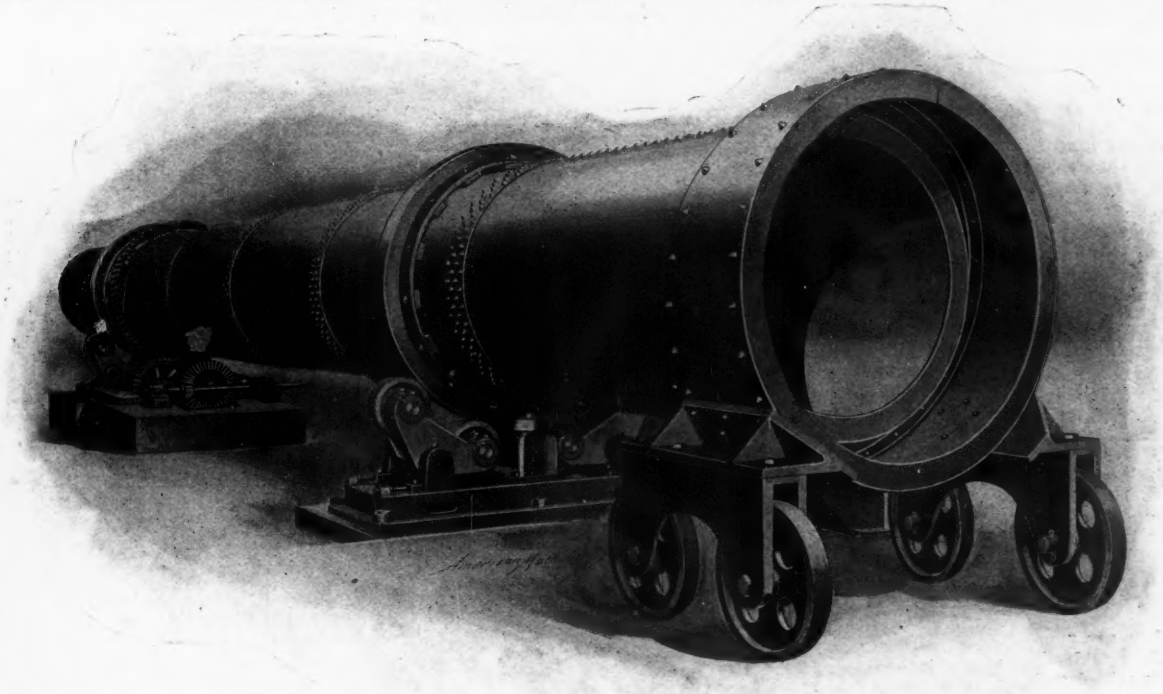
It is evident that there is some variation in heat required, and in fast, we can probably find a range all the way from a little more than 2,000 to 2,800 Fahrenheit, and the results be satisfactory in each case. The capacity of a rotary kiln is given as averaging between 150 and 220 barrels in twenty-four hours from dry powdered material and from 100 to 150 from wet slurry.

It is said that the coal dust and air blown in generates a very high temperature at a distance of about 12 ft. from the lower end of the kiln, but it is rather difficult to explain in detail the effect of heat in a kiln. I may undertake to explain it a little more in detail at some future time, but right now I am going to leave that part of the subject and follow the burned material that comes from the lower end of the kiln.

Cooling the Clinker.

Of course, the clinker is red hot when it is discharged from the lower end of the kiln, and it must be cooled before it can be ground. There are various ways of doing this, and it is not possible to give the details of all of them, but an idea in general may be had from the followng brief description given by Lathbury & Spackman on the manner of handling clinker in Alsen's Portland Cement Works. West Camp, N. Y.: "After the clinker is discharged from the rotary kilns it passes into sealed concrete cooling vaults, located directly under the kiln room floor. Here the clinker is allowed to remain, cold air being driven in from below while the hot air drawn out at the top is then forced back into the kilns mixed with pulverized coal. The cold clinker is afterward discharged into cars which run in a tunnel under the cooling vaults. These cars, operated electrically, are afterwards raised to the top of the bins supplying the ball mills, and the contents discharged into these bins."

Then in handling the clinker for puverizing, it is practically the same thing as the process of preparing the raw material. It may be either a combination of ball and tube mills, or some other grinding and pulverizing process. The point that must always be kept in view is the fact that it must be ground exceedingly fine. C. M.



ROTARY KILN—MADE BY THE VULCAN IRON WORKS, WILKESBARRE, PA.

CEMENT NEWS ITEMS.

It is said that the Northampton Portland Cement Co., Stockertown, Pa., will likely erect another cement mill.

The Pittsburg Portland Cement Co. has been incorporated at Pittsburg, Pa., with a capital stock of $200,000.00,

It is said that the Alpena Portland Cement Co., Alpena, Mich., has orders ahead to take care of its output all winter.

The Cayuga Lake Cement Co., Canastota, N. Y., has been awarded a contract to furnish the state 10,000 barrels of cement.

S. P. Steece, Ironton, Ohio, and others have purchased land in Upper and Perry townships, and will erect a plant to manufacture Portland cement.

The Atlas Portland Cement Co. now has over 1,000 men at work building the new cement plant at Hannibal, Mo., and will probably have 500 more.

The Wolverine Portland Cement Co., Coldwater, Mich., has recently bought 250 acres more of marl land, to keep up their supply of raw material for making cement.

The Buckeye Portland Cement Co., Bellefontaine, Ohio, now has all its machinery installed in its new plant and will begin turning out Portland cement October 1.

The Great Northern Portland Cement Co., is erecting a plant at Baldwin, Mich., to manufacture 4,000 barrels of cement a day. The plant will be ready for operation about February 1.

It is reported that the Atlas Portland Cement Co., New York City, has purchased the half-completed plant of the Pennsylvania Cement Co., Bath, Pa., and will complete the plant and operate it.

The plant of the Pacific Portland Cement Co., Salina, Cal., is now in operation. At the present time, the plant is only running on 600 barrels capacity, but can be enlarged at any time to 2,000 barrels.

It is reported that the Illinois Central Railway handled 120 cars of imported German cement recently for Alfred Hiller Co., Ltd., New Orleans, La., the cement being shipped from the port of New Orleans to Cincinnati.

Solicitors Reeder and Coffin, Easton, Pa., have made application for a charter for the Flintic Portland Cement Co., which is being incorporated by John G. Meyers, John W. McKnight, Louis H. Meyers and Ira Judson Coe.

The Moore Cement Manufacturing Co. has been incorporated at Winnipeg, Manitoba, with a capital stock of $100,000.00. The incorporators are: Wesley Moore, John Moore, farmers, Miami; L. S. Vaughan, D. L. S., Selkirk; O. J. Grain, M. D., Selkirk, and John Haffner, accountant, Selkirk.

It is stated that W. L. Sperry, P. O. Box 234, Cumberland, Md., is interested in a project to erect a cement plant.

It is reported that Mr. Otto Fritz, Munich, Germany, has taken out a patent on a new process for manufacturing cement, the object of which is to manufacture cement free from the ordinary gray color for decorative purposes and for manufacturing artificial stone, etc. The cement is composed of a clay, such as kaolin, or pipe clay, feldspar (orthoclase or its equivalent), and lime, all of which ingredients must be as free from iron as possible. The mixture of clay and feldspar may be regulated in such a way that the high fusing temperature caused by the absence of iron compounds and alkalies, and also by the too high alumina contents caused by the use of such a clay as kaolin, are reduced, and may be confined to the conditions proved to yield the best cement. The mixture is treated with the usual amount of lime in the manner usual in cement making, and burnt to a fusing point.

How Rock Wool Is Made.

The manufacture of rock wool, although apparently a strange idea in the abstract, is in reality a comparatively simple process, but none the less interesting for all that.

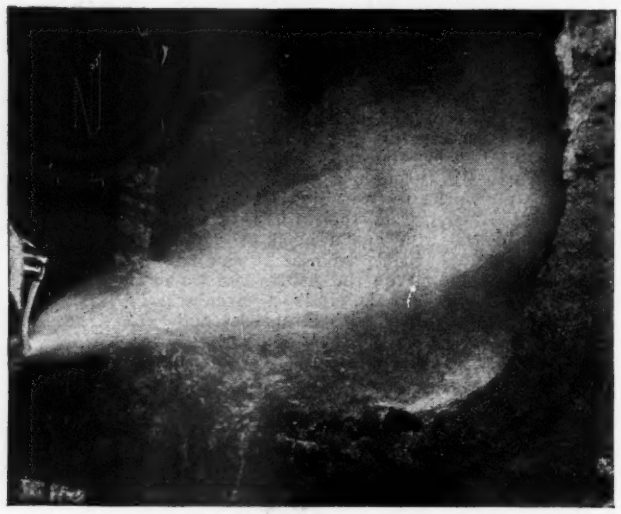
The Origin of the Process.

The process consists essentially of melting rock and then passing the molten material through a high-pressure steam blast and blowing the liquid lava into shreds or fibrous flakes. The discovery of the process is credited to Mr. John Player, of Norton, near Stockton-on-Tees, England, who secured a patent on it May, 1870. This patent, it should be borne in mind, covered the subject in general, which relates not only to the production of rock wool, but also to mineral wool. There are various stories, however, about the inception of this idea and the process of using furnace slag in the manufacture of mineral wool. One story has it that a furnace operator discovered that particles of slag which had been blown out on the water near his plant had a peculiar soft, fibrous nature, and this discovery put him to thinking and experimenting, with the result that slag was converted into a fibrous material for insulating and fireproofing.

A Result of Volcanic Action.

The idea may readily be traced further back than that, however, for even nature takes a hand in this process, and has been doing so ever since volcanoes have been in existance, for frequently the molten lava from volcanoes forms a soft, fibrous substance. It is said, for example, that a spray from the molten rock emitted from the volcano of Kilauea, Hawaiian Islands, during eruption, is blown by the strong winds into fine glassy fibers, called the "Hair of Pele," which is said to have the same nature and character as the granite rock wool or rock cotton made by the American Insulating Material Manufacturing Co.

MAKING ROCK WOOL—FEEDING FURNACE.



MAKING ROCK WOOL—VIEW OF BOTTOM OF FURNACE AND STREAM OF MOLTEN LAVA BEING BLOWN BY A STEAM JET.

The Raw Material for Rock Wool.

There is a distinction between the manufacture of mineral wool from furnace slag and the manufacture of rock wool in the material used, but the general process is practically the same. In the manufacture of rock wool at the plant of the American Insulating Material Manufacturing Co., of St. Louis, Mo., which is located in the Southern end of the city, called Carondelet, the material used for granite rock wool is a mixture of granite and limestone in the proportion of two of granite to one of limestone. A gray granite is used, but just what special limestone the writer did not learn—it would have been a poor return for the hospitality shown to have inquired too closely. The mixing was done to secure the fibrous product, experiments having demonstrated that either the lime or granite treated alone produced a fine white powder instead of a fibrous substance. There may be other combinations of stone that will produce this fiber, but so far none have been made public.

Laboratory experiments along this line are mentioned in which four parts of orthoclase feldspar and six parts of dolomite limestone are mixed and fused.

Melting Rock at 4,000 Degrees.

The first step in the process of manufacture consists in crushing the rock and mixing it in proper proportions. This crushing and mixing is done on what might be called the second floor, which leaves the raw material level with the upper part of the cupolas, or cylindrical furnaces, which are used to melt it. These furnaces are similar in general character to cupolas for melting iron, being about 25 feet high and 58 inches in diameter. The crushed material is scooped into the furnaces, together with a special quality of coke, while down under the floor they have a blower, combined with a special device for mixing the gases of combustion with the coke to obtain the degree of heat necessary. The degree of heat required to melt this rock is something enormous, being approximately 4,000 degrees Fahrenheit. This is almost three times the heat required to melt iron, which is 1,992 degrees Fahrenheit.

When standing on this raw material floor and watching them feed the furnace, one becomes impressed with the magnitude of this heat, because it is so intense that when a fresh quantity of stone is shoveled in, it is disrupted or broken up so violently that the noise is frightening, and the timid visitor is sure to shy off from the furnace. In fact, this crushed stone breaks up with a succession of explosions, and pieces can be seen popping and flying about the top of the furnace at an alarming rate.

Viewing a Miniature Volcano.

If the visitor will then leave the top floor, and go down below, where the melted rock is discharged from the furnace, he will see a sight of which the best picture and description can give him but a dim idea. There the melted rock flows from bottom of the cupola through a trough in a stream of about a half-inch in diameter, but just as it flows out it comes directly in front of a powerful steam blow pipe and is apparently simply blown out of existence. The only thing visible to the eye is a strong jet of whitish looking steam and a number of spitefully flashing sparks of fire, and the heat and noise reminds you of volcanoes. If the attendant is in a communicative mood, he will tell you, while you are standing awe-struck at this sight, of the troubles that arise incident to the immense heat required in the work. The heat is so fierce that notwithstanding the fact that the furnace is lined with the best firebrick that can be secured and liberally used, so far as thickness is concerned, the furnace can be operated only three days continuously, after which it is necessary to replace the firebrick lining. This difficulty constitutes one of the greatest handicaps to the industry, for if some material could be secured for this lining that would stand against the heat for any reasonable length of time, it would materially reduce the cost of producing rock wool.

How the Product Is Garnered.

But, to return to the substance that has been apparently blown away, it has in reality been blown into a large room or chamber, into which it falls like flakes of snow. The chamber or cooling room into which it falls are each 24 ft. high, 40 ft. long and 25 ft. wide. Their capacity is 30 tons each and can be filled in 10 hours. The fibers, as they fall in the cooling room, the temperature of which averages about 93 degrees Fahrenheit, are somewhat coarser than sheep's wool, but not so long; the greasy feeling of the latter is, however, entirely lacking. The rock cotton and granite rock wool is there baled or put up in bags and is ready for the market or for converting into various forms required for insulating material, such as pipe and boiler covering, fireproofing material, wall insulation for cold storage houses, packing houses, breweries, dwellings, refrigerator cars, etc. It is made by a special process into Sawyer's rock cotton insulating blocks. The raw product is also exported to Europe, Australasia, the West Indies and South Africa, one recent consignment thither consisting of 300 tons of rock cotton in bales, said to have been the first shipment of American fiber to that market.

If you go around and enter this chamber at the far end, you will observe a peculiar warm oder that will likely remind you of the farm and the days of lye hominy.

Granite Rock Wool Analyzed.

In converting granite rock into wool, it has been found that the material increases in bulk about 20 to 25 times, so that the resulting fibers encase 20 times the quantity of air that the raw material did. The specific gravity of granite rock is 1.66 per cent. It is, therefore, somewhat lighter than slag, and the wool is also whiter and nicer. In fact, granite rock wool is practically a white substance.

Another advantage claimed for it over mineral wool is that it is entirely free from sulphur, and acids and is perfectly non-corrosive. According to Regis Chauvenet & Bro., analytic chemists, 709 Pine Street, St. Louis, Mo., the component parts of granite rock wool are as follows:

Silica	42.84
Albumina and Iron Oxide	1.40
Lime, CaO	51.74
Magnesia, MgO	2.75
Sulphuric Acid	.....
Undetermined	1.27
	100.00

A Few of the Uses of Rock Wool.

The uses of granite rock wool and rock cotton are too numerous to mention, but it would hardly be fair to leave the subject without refering to some of them. It is a great fireproofing material, as it is non-combustible and practically indestructible by heat. It is claimed also that its use in the walls of buildings is a great protection aganst rats, mice, insects, etc., because the fine fibres of glass are irritating to anything which attempts to burrow in them. It also has the property of deadening sound, and therefore, is very valuable material in this way also. It is not only a non-conductor of sound, but a non-conductor of heat and cold, and is therefore not only used as a covering for boilers, steam pipes, etc., but equally well as a non-conductor in cold storage and refrigerating work of all kinds.

From the various uses to which it is put, it is evident that the wool must be manufactured or made up into various forms, and in another building connected with the plant, one can see crude

wool being converted into sheet roofing, round sections for pipe covering, various shaped blocks for boiler covering; and in fact, every imaginable form for use in insulating, and fireproofing in all classes of work. Another one of its uses, which should not be overlooked, is in filtration, for the manufacturers claim that nothing is so pure for filtering purposes as granite rock wool fibre.

The Home of the Industry.

The original and sole makers of granite rock wool, so far as we know, is the American Insulating Material Manufacturing Co., mentioned above, with offices at 213-215 North Third Street, St. Louis, Mo. We have before us a sample of this fiber made into a block, which they call their rock cotton insulating block, which only weighs about half as much as the same quantity of cork. We understand, also, that important points of the process are covered by letters of patent, and while they are always glad to give information in regard to the process of manufacture, and willingly show visitors through the plant, it is but natural to expect that they would resent any infringement.

Chas. Hildebrand has established a marble and granite works at Lorain, Ohio.

The Ottawa (Ill.) Silica Co. has been building some new additions to its plant, and increasing its facilities for getting out sand, so as to keep up with their increase in business.

It is reported that James Israel has been appointed receiver for the J. S. Coxey Steel and Silica Sand Co., which owns a sand bank near Massillon and a large steel plant at Mount Vernon, Ohio.

It is reported from East Liverpool, Ohio, that William Marquette will erect a plant to grind sandstone, and will install crushing stone machinery to grind it into sand. He will put in a quarrying equipment and will get out stone for curbing and bridges.

The Louisiana Gravel Co., Ltd., has been incorporated at New Orleans, La., with a capital stock of $50,000.00 to mine and market gravel, etc. The officers are C. J. Gray, president; R. M. Ong, Sr., vice president; W. M. McGowan, secretary, and the office of the company will be at 510 Gotschaux Building, New Orleans.

Mica and Its Uses.

According to Dr. Joseph Hyde Pratt, who covers the subject of mica in the Mineral Resources of the United States, up to the year 1901, mica has been found in many States, but in only a few has the occurrence been of commercial value.

In the last few years, mica has been mined in the following States: Alabama, Arizona, California, Colorado, Connecticut, Idaho, Maine, Missouri, Nevada, New Hampshire, New Mexico, New York, North Carolina, Rhode Island, South Dakota, Virginia and Wyoming. During 1901, however, the only States that produced any mica were New Hampshire, New Mexico, North Carolina and South Dakota, by far the larger amount being obtained from North Carolina.

The total amount of plate mica produced in the United States during 1901, as reported to the Survey, was 360,060 pounds, valued at $98,859.00, as compared with 456,283 pounds, valued at $92,758.00, in 1900. There was a large falling off in the amount of scrap mica produced in 1901, estimated at 2,165 short tons, valued at $19,719.00, as compared with 5,497 tons, valued at $55,502.00, in 1900. The importation of mica from Canada and India tends to curtail the production in the United States, especially the Indian mica, which can be imported at a cost lower than that for which it can be mined in this country. There was an increase in the production of plate mica in North Carolina, but a large falling off in the production of scrap mica.

The imports of mica in 1901 were valued at $335,054.00, as compared with $319,560.00 in 1900, and with $275,984.00 in 1899.

The use of mica in sheets for stoves, chimneys, etc., has increased greatly, but still more the use of small circular disks and rectangular pieces of mica for insulation purposes and for electrical apparatus. Ground scrap mica is used in the manufacture of wall papers, lubricants, etc. Scrap mica, also, arranged on a wire net coil, and then pressed into proper shape, is used very satisfactorily as a boiler tube covering, mica being a non-conductor of heat.

There are several varieties of mica, just as there are of feldspar, the two most important species being the muscovite and biotite. The feature that distinguishes mica from other associated minerals is its easy and close cleavage, which allows it to be split into leaves as thin as a sheet of paper. The muscovite is ordinarily distinguished from the biotite by its white or silvery light color. The darker or black mica is the species called biotite.

Mica belongs properly to what are called rock-forming minerals. In other words, while a great mass of rock is composed of quartz and feldspar, there are numerous other minerals widely distributed through the rock, and among these are included mica, hornblende, etc. The black mica especially is a common constituent of granite, as well as occuring in a number of igneous rocks. In the latter instance, however, it is regarded more as a visitor than as a constituent.

Coal.

Coal Mining Accidents in 1901.

In his report on the production of coal in 1901, now in press, in "Mineral Resources of the United States, 1901," United States Geological Survey, Mr. E. W. Parker presents the statistics of fatal and non-fatal accidents which occured in the process of mining coal in eighteen States and Territories during 1901.

In the following table are shown the details of accidents, together with the number of wives made widows and the number of children made fatherless for the State from which it has been possible to secure the figures.

Fatal and non-fatal accidents in the coal mines of United States in 1901:

State.	Number of men killed.	Number of men injured.	Number of wives made widows.	Number of children made fatherless.	Number of tons mined for each life lost.
Alabama	41	(a)	(a)	(a)	221,928
Arkansas	18	63	14	38	100,896
Colorado	55	71	(a)	(a)	103,637
Illinois (b)	98	422	55	139	253,716
Indiana	(a)	(a)	(a)	(a)	.....
Indian Ter.	49	98	26	(a)	49,424
Iowa	29	59	(a)	(a)	193,707
Kansas	16	35	9	(a)	304,685
Kentucky	21	109	(a)	(a)	260,476
Maryland	12	110	6	21	426,094
Michigan	6	18	(a)	(a)	206,884
Missouri	15	16	8	14	253,333
Montana	(a)	(a)	(a)	(a)	.....
New Mexico (b)	9	11	(a)	(a)	135,282
Ohio	72	432	(a)	(a)	290,886
Pennsylvania:					
Anthracite	513	1,243	277	624	131,524
Bituminous	301	656	184	412	273,288
Tennessee	(a)	(a)	(a)	(a)	.....
Utah	9	12	(a)	(a)	146,957
Virginia	(a)	(a)	(a)	(a)	.....
Washington	27	82	4	11	95,489
W. Virginia	134	184	58	90	179,525
Wyoming	41	12	18	37	109,399
Total for 18 States and Territories	1,467	3,643	.....	.....	(c) 188,668

(a) Not reported. (b) Fiscal year ending June 30. (a) Average.

In these eighteen States and Territories the total number of lives lost in 1901 was 1,467, and the total number of men injured was 3,643. The number of tons of coal mined for each life lost varied from 426,094 in Maryland to 49,424 in Indian Territory. The average number of tons mined for each of the 1,467 lives lost in these eighteen States and Territories was 188,668. It is interesting to note that in Pennsylvania the number of tons of bituminous coal mined per life lost was a little more than double the amount mined per life lost in the anthracite mines in the same State. Maryland enjoys the distinction of the largest tonnage per life lost, while the Indian Territory has the largest percentage of deaths for the tonnage mined

It will be observed that of the eighteen States and Territories one makes no report of the number of men injured, and seven, or more than one-third, make no report of the number of wives made widows; and ten, or more than one-half, made no report of the number of children made fatherless. Indiana, Montana, Tennessee and Virginia, producing in round numbers 15,000,000 tons of coal in 1901, made no reports of coal mining accidents.

The total number of men employed in the coal mines of the United States in 1901 was 485,544, who made an average of 216 working days, as compared with 448,581 men, with an average of 212 working days in 1900. The distribution of this labor in 1901 was as follows: In the anthracite mines, 145,309 men, with an average working time of 196 days; in the bituminous mines, 340,235 men, with an average working time of 235 days.

MAKING ROCK WOOL—MASS OF ROCK COTTON IN RECEIVING CHAMBER READY FOR BAGGING.

Reports from Hull, Ont., state that members of the Durham (Ont.) Cement Co. have been looking over the ground at Hull, with a view of locating a cement plant at that place, to manufacture 2,000 barrels of cement a day.

Stone.

Growth of the Granite Industry in 1901.

The United States Geological Survey has issued a little book covering the stone industry for the year 1901, which is composed of extracts from the "Mineral Resources of the United States," is now on press.

The greatest increase in stone for the year over 1900 was in limestone, of which mention was made last month. One of the chief factors of the industry during the year was the increased value of crushed stone, which covers granite, limestone and sandstone. This is attributed largely to the interest manifested in building better roads, and quite a little of it was also due to the increased use of concrete for paving and building purposes. Next to limestone, granite showed the greater increase for the year, the increase being over 26 per cent. above that of 1900. This includes the value of trap rock, which was quite a factor in several of the States, particularly in the New England and Eastern States and California. Under this head is also included the lava stone or the tufas of Colorado and other Western States; also many quartizites and jasper stone of Minneasota.

Taking the granite production alphabetically by States, we find that the production decreased in Arkansas, but this decrease was in the value of rough stone, paving block stone and crushed stone showing a slight increase.

California shows an increase of a reasonable amount, and now ranks fourth among the granite producing States, having come up from the sixth place during the year, exceeding this year the values of New Hampshire and New Jersey. One feature of the California granite industry was the increase in granite used for road matter. The granite used for concrete in California was greater in point of value than that given for any other State, and the value of railroad ballast ranked third.

Colorado showed a slight decrease in quantity, but more production is reported in 1901 than the year prior, several new companies having reported for the first time.

Connecticut showed an increase of something over $100,000.00 above 1900, the increase being in the value of rough stone and dressed monumental work, the production of dressed building stone showing a decrease.

The State of Georgia more than doubled its production in granite in 1901, producing the greatest amount of this stone in its quarries since the year 1891, when the total value was $790,000.00. One of the branching industries in that State showing a decrease was in dressed monumental work. In paving block, Georgia nof ranks third in the list of States, having jumped during the year from $28,652.00 the previous year to a total of $328,087.00 in 1901. Another point of considerable increase was in the value of crushed granite.

The State of Maine comes to the front in the report for the year 1901 with an increase, which helps it to the first place in the rank of granite producing States, marking the first time in which this State has ever exceeded Massachusetts in granite production. The greatest increase in Maine was in the value of dressed building stone, crushed stone also showing a remarkable increase in that State. Dressed monumental work showed a slight decrease, but paving block showed a nice increase, as also did curbing and flagging.

Maryland showed an increase of over $100,000.00 for the year.

Massachusetts showed an increase of over half a million dollars, but the gain was not enough to keep that State in the first place as a granite producer. The value of crushed stone in Massachusetts showed an increase, as did trap rock for road material, the factor in this matter being the State aid in road construction. The largest factor in the increase for the year in the Massachusetts industry was in dressed monumental work, the increase being in this one line $155,700.00.

Minnesota showed a very healthful gain, the greatest part of it being in rough stock and paving blocks, dressed stone for building purposes showing a slight decrease.

Missouri showed up with a decrease in 1901, which seems to have been due to a falling off in all lines, except rough stock which increased slightly. Part of this decrease is attributed to the use of vitrified brick instead of paving blocks.

New Hampshire, though it showed an increase for the year, fell back from the fifth to the sixth place in the rank of States for 1901. This State showed the third largest production, however, for dressed building material, being exceeded only by Maine and Massachusetts.

New Jersey showed a decrease in the granite production for the year, the greatest slump being in dressed stone for building purposes. The one item mentioned as showing any increase was paving block.

New York showed a gain for the year, the increase coming from the paving block industry.

North Carolina showed an increase in the value of granite production, ranking second in the amount of railroad ballast production.

Pennsylvania showed an increase of nearly $90,000.00, and the greater portion of granite was used for road material.

Rhode Island showed a very healthy increase in its granite industry.

South Carolina is one of the States that has been making rapid strides in the granite industry during the last five years, and now ranks fifth as a granite producing State, the great factor in the increase being the stone used for jetty work.

Vermont ranks third as a granite producing State, being exceeded only by Massachusetts and Maine. The value of granite monumental work furnished by this State, both rough and dressed, is greater than of any other State, Massachusetts coming second in this line. Dressed building stone showed a decrease for the year, but paving block showed an increase.

Virginia showed a healthy increase for the year, the increase being largely in paving block and crushed stone, while rough building stock decreased slightly.

Washington and Wisconsin both showed a decrease for the year, the decrease in Wisconsin being in dressed material for building and monumental work. Rough stock and paving block showed a slight increase.

Value and Uses of Bluestone Produced in the United States in 1901, by States.

State.	Building Purposes.	Flagging	Curbing.	Gutter and Crossings.	Coping, Steps, Sills. and Lintels.	Other Purposes.	Total Value.
New York	$156,091	$230,453	$206,455	$32,466	$164,296	$48,363	$838,124
Pennsylvania	103,718	87,008	42,747	12,189	35,044	45,651	326,357
Total	$259,809	$317,461	$249,202	$44,655	$199,340	$94,014	$1,164,481

Value of Sandstone Production in 1901 by States, and Uses.

State	Building Purposes	CRUSHED STONE: Railroad Ballast	CRUSHED STONE: Road-making	CRUSHED STONE: Concrete, Etc.	Paving	Riprap, Rubble, etc.	Curbing	Flag stones	Grind-stones	Whet-stones	Other Purposes	Total
Alabama	$ 1,800	.....	.....	.....	.....	$ 2,000	.....	.....	.....	.....	$ 4,800	$ 8,680
Arizona	202,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	202,500
Arkansas	10,805	$ 700	$15.136	$ 20,368	$ 2,000	$ 3,278	$ 10,256	$ 232	.....	.....	50	62,825
California	230,521	.....	23,000	1,000	29,594	16,633	.....	280	.....	.....	.....	301,028
Colorado	93,534	.....	15,500	.....	.....	24,4 6	.....	85,491	.....	.....	18.400	237,331
Connecticut	114,795	.....	.....	.....	.....	1,470	.....	.....	.....	.....	30,549	146,814
Idaho	20,843	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20,843
Illinois	8,720	20	.....	.....	523	355	.....	2,042	.....	.....	1,224	12,884
Indiana	23,475	.....	.....	.....	650	4,098	.....	111	.....	$ 6,625	.....	34,959
Iowa	13,491	.....	275	.....	251	178	.....	71	.....	.....	75	14.341
Kansas	15,891	450	.....	.....	1,775	125	.....	31,370	.....	.....	200	49,901
Kentucky	100,-69	.....	.....	.....	6,000	.....	.....	830	.....	.....	860	108,2 9
Maryland	4,546	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,546
Mass.	176,850	.....	14,600	5 ,800	.....	400	.....	.....	.....	.....	4 660	247 310
Michigan	128,909	.....	.....	.....	.....	26.519	.....	.....	$104,200	11,950	19.000	290,578
Minnesota	85,800	.....	3,015	6,500	82,500	52,870	.....	.....	.....	.....	16,000	246,685
Missouri	32 899	.....	2,884	12	1,890	3,278	.....	146	464	.....	597	42,170
Montana	39,135	.....	.....	2,30	.....	15,684	.....	200	2,280	.....	1,120	60,719
Nebraska	515	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	515
New Jersey	211,318	.....	7 6	75	64	18.7 5	.....	.....	.....	.....	13,594	244,512
New York	512,352	6,125	9,560	3,030	168,59	12.579	281,679	269,790	.....	.....	67,616	1,331,327
N. Carolina	11,100	.....	.....	.....	.....	582	.....	.....	.....	.....	.....	11.682
Ohio	936,6 0	2,000	5,230	7,775	.....	95,536	233,965	510,568	548,844	28,699	207,429	2.576,723
Oregon	482	.....	49	.....	.....	.....	.....	.....	.....	.....	.....	531
Pennsylvania	1,544,621	20,157	28,919	7,866	65,067	78.243	85,676	113,508	.....	.....	119,025	2,063,182
S. Dakota	13.325	.....	.....	.....	.....	4,272	.....	.....	.....	.....	50	17,647
Tennessee	10,180	.....	.....	50	.....	.....	.....	.....	.....	.....	112	10,342
Texas	39,605	.....	10,000	.....	.....	28.915	25,000	8,000	.....	.....	45	111,568
Utah	32,636	.....	.....	.....	.....	3,224	.....	3,000	.....	.....	59	38,919
Virginia	4,703	.....	.....	.....	.....	600	.....	.....	.....	.....	.....	5,303
Washington	67,480	.....	.....	240	.....	20,050	.....	.....	.....	.....	1,404	89,174
W. Virginia	95,4 6	1,435	60	235	.....	5,660	.....	214	3,700	.....	.....	106.710
Wisconsin	72,229	.....	1,519	.....	.....	15,500	.....	328	.....	.....	840	90,425
Wyoming	18,118	.....	.....	23,706	.....	12,321	.....	.....	.....	.....	.....	54,145
Totals	$4,875,973	$30,887	$13,503	$123,957	$358,910	$447,520	$636,722	$1,026,499	$659,024	$47,274	$507,709	$8,844,978

Value of Granite Production in 1901, by States and Uses.

STATE	SOLD IN THE ROUGH: Building	SOLD IN THE ROUGH: Monumental	SOLD IN THE ROUGH: Other	Dressed for Building	Dressed for Monumental Work	Made into Paving Blocks	Curbing and Flagging	CRUSHED STONE: Ballast	CRUSHED STONE: Road-Making	CRUSHED STONE: Concrete	Riprap, Rubble, Etc.	Total
Arkansas	.....	.....	.....	.....	.....	$ 2,627	$ 12,496	.....	$3 500	2,377	$2.554	23.555
California	$ 25,957	$ 38,755	$ 6,815	$ 358,832	$ 72,258	46.300	22,200	$ 62,103	110,871	202,967	189,518	1,134,674
Colorado	46,650	7,562	.....	60,835	1,787	5,750	397	.....	750	1,440	14,825	138,996
Connecticut	108,959	26,267	24,374	94,611	70,895	29,533	14.358	.....	213,672	2,634	31 342	616,654
Deleware	9,769	.....	2,078	1,750	400	32.191	2,853	87,263	.....	.....	535,000	671,204
Georgia	54,321	22.315	2,825	57,207	14,526	328,087	155,920	25,700	35,545	36,925	28,375	761,646
Idaho	100	5,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	5,100
Kas. & Indian Territory	2,340	.....	.....	7,800	.....	.....	62	37,333	.....	459	545	48,530
Maine	407,418	24,475	27,447	1,501,797	76,276	401,189	124,535	25,325	59,714	5,460	49,480	2,703,116
Maryland	181,908	20,180	1,500	188,568	7,800	51,637	42,045	13,092	37,962	50,404	18,560	613,356
Massachusetts	333,047	236,327	118,567	455,535	236,273	364,721	156,325	5,455	135,775	50,593	233,640	2,216,268
Michigan	.....	.....	.....	.....	.....	.....	.....	.....	2,706	.....	.....	2 706
Minnesota	13,215	42,197	1,550	55,017	96,902	20,002	18,155	40	1,025	1,020	10,982	260,105
Missouri	550	17,406	3,095	.....	.....	40,651	3,142	.....	27,862	.....	4,100	95,806
Mont. & Nev	.....	.....	.....	15,600	3,500	.....	200	.....	.....	.....	.....	16 300
New Hamps're	156,332	52,231	9,797	363,927	171,239	112,581	28,708	3,615	7,140	14,468	14,926	935,494
New Jersey	60,905	2,515	.....	19,888	.....	87,933	.....	43,500	677,176	450	1,800	894,167
New York	24,312	1,325	6,150	97,350	6,283	33,025	773	40,000	262,410	28,200	.....	489,828
N. Caaolina	27,464	4,105	2,212	68,975	6,813	10,862	51,733	64,660	17,223	3,200	4.041	261,188
Oregon	3,748	250	1,590	3,900	1,116	.....	150	.....	.....	.....	.....	10 754
Pennsylvania	63,567	1,050	4,538	18.916	227	15,712	7,611	48,686	294,686	25,406	5,308	486,708
Rhode Island	9,722	92,974	110	160,190	198,831	27.766	2,459	.....	5,976	1,000	3,073	501,698
S. Carolina	56,831	23,433	5,730	165,594	12,789	8,276	2,923	46,835	21,806	10,450	641,617	976,084
South Dakota	25,106	.....	2,159	1,650	.....	52,089	795	.....	.....	3,000	15,142	99,941
Texas	2,652	11,521	.....	243	10,400	.....	2,189	.....	.....	.....	.....	27,005
Utah	2,288	3,300	.....	.....	.....	.....	.....	.....	.....	.....	.....	5,588
Vermont	208,825	534,755	101,779	16,343	354,563	16,304	10,400	400	1,707	.....	752	1,245,828
Virginia	40,763	8,300	230	45,737	52,404	17.253	7,977	7,841	9,850	42,317	43,029	275,701
Washington	9,100	2,250	.....	3,000	.....	3,360	9,000	4,920	.....	4,948	7,230	43.808
Wisconsin	3,575	79,175	28,015	17,999	62,277	113,682	3,500	.....	81,610	.....	120	389,953
Wyoming	2,810	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.810
Total	$1,878,835	$1,227,668	$350,071	$3,781,294	$1,457,557	$1,821,431	$670,703	$516,768	$2,008,966	$477,709	$1,755,959	$15,976,961

Last Year's Work in Sandstone.

The sandstone production for 1901 showed an increase of over a million and a half dollars above that of previous years.

Ohio, as usual, leads in the production of sandstone, but in the race for second place Pennsylvania pulled ahead and left New York, which was second in 1900, to bring up third place for 1901. This is accounted for by some inactivity in the New York quarries in and around Hulburton, Holley and Medina, while in Pennsylvania there was a considerable increase in sandstone quarrying, owing to a large amount of this stone being used in railway bridge building. These three States are the only ones in which the production of sandstone passed the $1,000,000.00 mark, the next highest State being that of California, with less than a half million.

In the building stone line Pennsylvania showed the greatest production, with Ohio next. This, of course, includes railway bridge material, which gave the great increase in Pennsylvania. Pennsylvania also showed the greatest production in crushed rock for road material, with New York and Minnesota showing the greatest production for paving purposes; Ohio and Pennsylvania, for riprap, rubble; New York and Ohio, for curbing; Ohio and New York, for flagging stones; while Ohio stands out prominently as the first producer in grindstones and whetstones, followed by Michigan in the second place.

Alabama showed a slight increase for the year, as did also Arizona, while Arkansas showed a considerable decrease.

California and Colorado both showed a healthy increase, while Connecticut showed a marked decrease. In fact, the decrease in sandstone industry in Connecticut has been marked for the last twelve years. This decrease, it is said, is due chiefly to the loss of former favor in which the brown sandstone of that State was held as a building material.

Illinois and Indiana both showed a slight decrease in their production, as did also Iowa and Kansas. Kentucky showed an increase, owing to a greater demand for railroad bridge work.

Massachusetts showed an increase of over $100,000.00, and Michigan showed a gain of about half that amount.

Minnesota showed a slight increase, while Missouri showed a decrease and Montana a slight gain.

New Jersey showed a slight gain for the year, which was in material for building purposes, while New York showed a decrease. The chief sandstone producing region of New York is in a comparatively narrow belt in Orleans County, in the Western part of the State, and it is generally known as Medina sandstone, taking the name from the village where is was first quarried.

Value of Crushed Stone in the United States in 1901.

Kind.	Railroad Ballast.	Road Making.	Concrete.	Total Value.
Limestone	$1,758,541	$2,298,286	$1,214,815	$5,271,642
Sandstone	30,887	130,503	123,957	285,347
Granite	516,768	2,008,966	477,709	3,003,443
Total	$2,306,196	$4,437,755	$1,816,481	$8,560,432

Value of Trap Rock Produced in the United States in 1901, by States and Uses.

State	Made into Paving Blocks	Crushed for Roads or Ballast	Other Purposes	Total
California	$1,250	$121,120	$4,627	$126,997
Connecticut	193	202,006	11,784	213,983
Massachusetts		128,079	2,469	130.548
New Jersey	83,922	633,129	44,286	761,337
New York	22,750	161,248	5,985	189,983
Pennsylvania	1,890	281,706	4,413	288,009
Total	110,005	1,527,288	73,564	1,710,857

Value of Various Kinds of Stone Produced in 1901, by States.

State	Granite	Sandstone	Slate	Marble	Limestone	Total Value
Alabama		$8,680			$619,423	$628,103
Alaska				$4,500		4,500
Arizona		202,500		300	300	203,100
Arkansas	$23,554	62.825		300	68,319	154,998
California	1,134,675	301,028	$18,608	6,642	645,455	2 106,408
Colorado	138,996	237,331			245,799	622,126
Connecticut	616,654	146,814			140,424	903,892
Delaware	671,204					671 204
Florida					51,870	51,870
Georgia	761,646		3,000	936,549	85,629	1,786,824
Idaho	5,100	20,843			21,251	47,194
Illinois		12,884			2,793,837	2,806,721
Indiana		34,959			2,993,186	3,028,145
Iowa		14 341			777,484	791,825
Kansas	48,530	49,901			478,986	577,417
Kentucky		108,259			199,567	307,826
Maine	2,703,116		202,325		715,272	3,620,713
Maryland	613,356	4,546	105,798	68,100	382,381	1,174,181
Massachusetts	2,216,258	247,310		126,546	244,039	2,834,153
Michigan	2,706	290,578			565,931	859,215
Minnesota	260.105	246,685	1,400		522,778	1,030,968
Missouri	95,806	42,170		2,100	1,362,272	1,502,348
Montana	15,200	60,719		1.500	143,866	221,285
Nebraska		515			154,717	155,232
Nevada	4,100					4,100
New Hampshire	935.494					935,494
New Jersey	894,167	244,512	30,000		309,738	1,478,417
New Mexico				10,600		10,600
New York	489,828	1,331,327	100,960	379,159	1,738,716	4,039,990
North Carolina	261,288	11,682			8,266	281,286
Ohio		2,576,723			2,606,502	5,183,225
Oklahoma Territory					32,497	32,497
Oregon	10,754	531		500	24,520	36,305
Pennsylvania	486,008	2,063,082	2,984,264	157,547	5,081,387	10,772.288
Rhode Island	501,698				38,030	539,728
South Carolina	996,084				28,500	1,024,584
South Dakota	99,941	17,647			53,780	171,368
Tennessee		10,342		494,637	330.927	835,906
Texas	27,005	111,568			209,658	348,231
Utah	5,588	38,919		320	78,900	123,727
Vermont	1,245,828		1,162,191	2,753,583	205,138	5,366,740
Virginia	275,701	5,303	178,979		986,177	1,446,160
Washington	43,808	89,174		22,816	234,587	390,385
West Virginia		106,710				106,710
Wisconsin	389,953	90,425			1,225,448	1,705,826
Wyoming	2,810	54,145			1,340	58,295
Total	$15,976,961	$8,844,978	$4,787,525	$4,965,699	$26,406,897	$60,982,060

STONE NEWS.

W. H. Burnham, Howard, Kas., has opened up a limestone quarry to get out flagstones and paving material.

The Kelly Marble and Granite Co. has been incorporated at Sparta, Ill., to manufacture and deal in marble.

The Sweeney Bluestone Co. has been organized at Saugerties, N. Y. The manager of the company is James J. Sweeney, of Kingston.

The Sharon Coal and Limestone Co. will hold a meeting of the stockholders November 8, to vote on the proposition of increasing their capital stock from $100,000.00 to $200,000.00.

Louis T. Kurtz, M. W. Leslie and others of New Castle, Pa., have options on some limestone lands near that place, and it is said that they will organize a company to develop the property.

Mitchell Bros., Ogden, N. Y., who have contract to do some stone work on the Federal Building at Salt Lake City, will, it is said, establish a branch office there, and Mr. R. C. Mitchell will move to that city and have charge of that branch of the business.

The Pueblo Stone and Clay Co. has been incorporated at Pueblo, Col., with a capital stock of $25,000.00. The incorporators are: T. G. McCarthy, C. O. Rice, W. L. Dorwald, A. E. Langworthy and E. A. Blunt.

Harry P. Palmer, of the Green Mountain Marble Co., Spokane, Wash., recently returned from a trip to Chicago and other points, in the interest of the company, and states that plenty of funds have been raised for pushing the development of their marble holdings.

The Northern Consolidated Granite Co. has been organized at St. Cloud, Minn., with a capital stock of $150,000.00, and it is stated that the new company will take over the property of the Arnold Granite Co. and that Walter Arnold, A. L. Cramb and others are interested.

The West Shore Stone Co. has been incorporated to work the Empire quarry in Catskill, which, it is said, will expend $150,000.00 improving the property. The officers of the company are: C. C. Bean, president; C. Austin Doll, secretary-treasurer; Albert Schmidt, general manager, all of New York City.

A novelty in the way of an express package was shipped from Barre, Vt., September 11, by Lee & Hall, granite manufacturers. It was a block of granite, weighing 3,300 pounds to be delivered at Hammond, Ind. and the charges on it were nearly $100.00. The block was intended to fill a rush order for the corner stone for the new City Hall at that place.

Montana Marble and Mining Co. has been organized at Helena, Mont., though we understand the articles of incorporation have not yet been filed, to develop marble properties in that locality, where some very high-class marble, it is said, has been found. Among those interested in this matter are: Judge W. Y. Pemberton, Butte, Mont.; W. B. Embry and C. E. Russell, Spokane.

Reports from Barre, Vt., state that the granite manufacturers of that place have secured one or two modifications on recent rulings on granite shipments, which went into effect September 1. Under the regulations that went into effect August 1, cars would not be placed free for loading for less than carload shipments. Under the new ruling, notice of which was received yesterday, the Central Vermont agrees to place cars for less than carload shipments, weighing in excess of 10.000 pounds, free of switching charge, providing such shipments are properly loaded.

Quarries.

Hugh Dunn has opened a quarry near Steubenville, Ohio.

Wm. Davidson has opened a stone quarry at Nanuet, N. Y.

J. W. Rowyer has opened up a small quarry on his farm near Stouchsburg, Pa.

Luther Lindauer, Kaukauna, Wis., will add a stone crushing plant to his quarry.

The Matthews Marble Quarrying Co., Poultney, Vt., are opening a new marble quarry.

The Allen granite quarries near Waterloo, N. Y., have been leased by New York parties, who are operating on an extensive scale.

The Brennan Construction Co., Washington, D. C., has bought quarry property in the suburb of that city, and will open up quarries.

C. J. Heins and E. R. Limes and others, of Wheeling, W. Va., have purchased slate land near Martinsburg, W. Va., and will open quarries.

The Beaver Dam Marble Quarrying Co., Cockeysville, Md., has a contract to furnish a lot of crushed stone for the Pennsylvania Railway Co.

Lloyd Bros., Toledo, Ohio, have been awarded the contract for the mosaic and marble work on the Toledo Railway Terminal Co.'s new Union Depot at that place.

The Burnett Granite Co. has been incorporated at Burnett, Tex., with a capital stock of $2,500.00. The incorporators are: Curt Ueberall, Felix Ueberall and Otto Zirkel, all of San Antonio.

The United States Marble, Iron and Coal Co. has been incorporated at Denver, Col., with a capital stock of $1,000,000.00 by Edward J. Wilcox, Grace B. Wilcox and Fred P. Richardson.

The Academy Granite Co. has been organized at Fresno ,Cal., by Edward Dubois and others, and has openel up quarries, getting out a bluish granite that, it is said, takes a high polish.

B. N. Arquitt & Sons, who operate limestone quarries near Farley, Iowa, have a number of orders on hand for building stone for churches and other work, which is keeping them pretty busy.

It is reported that through Alex. L. Scott, of Chester, Pa., the old Powell quarries at that place, which have been idle for several years, have been leased by Philadelphia parties, who will operate them.

The Diamond Stone Co. has been formed at Bloomington, Ind., with a capital stock of $100,000.00. The incorporators are: W. L. Whitted, A. H. Belden, Samuel Bray, Edward F. Hall and W. S. Hooper.

C. DeWitt, Dell Rapids, South Dakota, has secured a contract from the government to furnish between 150 and 200 carloads of riprap, to be used along the banks of the Colorado River, near Sioux City.

The Wilcox Dolomite Quarry Co. has been incorporated at St. Louis, Mo., with a capital stock of $20,000.00. The incorporators are: H. Tyler Wilcox, Mary E. Saylor, John Favorite, Wm. A. Goodwin and John J. McLain.

Mr. E. M. Kindle, of New Haven, Conn., is doing some geological work for the United States Geological Survey in the neighborhood of Titusville, N. Y. Reports state that he will cover the territory in Western New York and Pennsylvania.

The Hanison Fire Stone Co. has been incorporated at Mercer, Pa., with a capital stock of $80,000.00. This company is engaged in quarrying stone near Mercer. The incorporators are: L. M. Uber and A. O. Allen, of New Castle, and W. H. Hanison, of Mercer.

E. L. Smith & Co., Barre, Vt., have during the past summer made some important changes in the way of machinery in their quarry equipment, and are now able to get out stock of any size on particularly short notice, because of their ability to handle it with ease.

The Green Springs Supply Co. has been incorporated at Towson, Md., to conduct a mercantile business and develop quarries of marble, slate and other products. The incorporators are: T. Dudley Riggs, Wm. C. Orem, W. D. Goodwin, Geo. P. Mordecal and Geo. C. Morrison.

The Prentice Brownstone quarries on Wilson Island and Houghton Point, near Washburn, Wis., have been sold to W. G. Maginnes, of New York City, representing certain stockholders of the Prentice Brownstone Co., and it is thought the quarries will be opened up again.

If the reports of Western papers are true, the building of the Chicago, Rock Island and Pacific Railway through the Western part of Oklahoma will open up some new granite fields. There is said to be an abundance of granite in Greer County, Okla., and a large portion of it is said to be a fine quality of red granite.

The Pueblo Stone and Clay Co. has been formed at Pueblo, Col., to operate stone quarries about eighteen miles Northwest of that place, where there is said to be an abundance of white, hard sandstone. The company is to be incorporated for $25,000.00, and among those interested we note T. G. McCarthy, Dr. C. O. Rice and A. E. Langworthy.

Milwaukee Granite Co. is a new enterprise incorporated by a number of well-known Milwaukee men, with a capital stock of $75,000.00. The company has forty-three acres of land and two quarries about a mile southwest of Spring Lake and on the line of a new railway. J. C. Morrisey it seems is the owner of the ledge, and a stockholder in the company to develop the quarry.

The Ohio Western Electric Railway Co. has bought the old Greenwalt quarry at Bluffton, Ohio, and owned by A. Hauenstein and Peter Diller, and will operate, in connection with the new quarry, a stone crushing plant to prepare ballast for the road from Lima to Findlay, Ohio, and other points. It is said a crushing plant with a capacity of 600 cubic yards a day will be erected.

WHAT ABOUT EXHIBITING?

Do You Want to See an Exhibit at the St. Louis Exposition of Which the Rock and Clay Industries Might Feel Proud?

It is time to talk ways and means of exhibiting stone and other rock and clay products at the Louisiana Purchase Exposition at St. Louis in 1904, for this industry deserves to be more widely advertised by exhibits of this kind. There was an exhibit at the Buffalo Exposition, but it was in no wise in keeping, from the point of magnitude, with the stone industry of to-day, and it is time for us to do better in this respect.

The official report of this exhibit by the United States Geological Survey is as follows:

The exhibit of the stone quarried in the United States at the Pan-American Exposition at Buffalo was almost entirely in the Mines Building, but compared with the large yearly output of stone, the variety of stone quarried, and the great number of uses to which the stone is put in the United States, the stone shown at Buffalo was a very poor representation.

The permanent monument of the stone business, and the only permanent monument of the Exposition at Buffalo, was the New York State Building, built entirely of white marble from Vermont and designed for use after the Exposition as the home of the Buffalo Historical Society.

There were only four individual exhibits, that of the United States Marble Co., of Spokane, Wash.; The Cleveland Stone Co., of Cleveland, Ohio; The American Quarries Co., of Chicago, Ill., and the L'Anse Brownstone Co., of L'Anse, Mich. These four companies had small but very comprehensive exhibits of their material.

The L'Anse Brownstone Co.'s exhibit was installed on the outside of the Mines Building, thus indicating the fitness of this excellent stone for outside uses. It is a compact dark-brown stone. It was designed to show the use of the stone as a structural material, and also its possibilities for decorative purposes.

The Cleveland Stone Co.'s exhibit consisted of a pyramid constructed of the various kinds of grindstones manufactured by the company, and ranged from stones about 7 feet in diameter and 6 inches thick to very small wheels not more than 4 inches in diameter. This pyramid was partly inclosed by a paling showing the use of this sandstone as a building stone and its capability for dressed-work ornamentation.

Close by this was the exhibit of the American Quarries Co., of Chicago, Ill., with an exhibit showing the building and dressed stone effects which can be obtained from the Oolitic limestone of Indiana.

The exhibit of the United States Marble Co. was very comprehensive, and very interesting as showing the beginning of the marble industry in the State of Washington, and showing to the country at large a stone hitherto but little known in the marble market. This company began operations about three years ago. The marble shown was mostly green, and varied in color from a very light yellowish to a very dark green. The stone is beautifully mottled in white and yellow. The specimens shown consisted of the rough and polished marble, a carved marble mantel, and many novelties such as vases, cups and saucers, paper weights, etc.

Among the collective exhibits, the State of New York had a large number of cubes of the various kinds of stone produced in the State, so arranged that they might be examined easily by interested stone men. The stone was shown in dressed and rough face. However, this exhibit was in no way attractive, and did not adequately show the stone-quarry interests of the State. The different varieties of slate quarried in New York were also shown in the exhibit of the New York State Museum.

A collective exhibit of the building stone of Maryland, and the slates of the Harford County district, in the exhibit of the Maryland Geological Survey, showed stone from nearly all of the quarries in Maryland, well labeled and giving considerable information concerning the stone. There were also transparencies showing enlarged microscopic sections of the different stones.

In the Georgia exhibit, cubes of the various granites, marbles, limestones and sandstones were shown, and a column of dressed white marble.

In the Missouri exhibit, a considerable quantity of the granite, both dressed and rough, was shown. In the New Jersey exhibit were shown specimens of the trap rock, granite, sandstone and limestone from the different quarries in the State, and also a small exhibit of slate from the quarry of the New Jersey Slate Co., at Newton, N. J. The California exhibit contained specimens of the onyx marble found in that State. The exhibit of Oregon showed specimens of black marble, and other stones obtained from that State, but without sufficient labeling to show in what part of the State, and by whom the stone was produced. The same may be said of the exhibits of stone from Idaho. In the Mines Building also were exhibits of granite and other building stones from Canada, and a very attractive exhibit of silicified wood from Arizona. While this product does not come strictly under the list of stone quarried, the polished material has to a certain extent come into competition with marble and onyx in its use for table tops, ornamental novelties, etc. Its hardness and the difficulty in polishing it make it very expensive. The entire stock of this stone is controlled and worked by the Drake Co., of St. Paul, Minn. In the Mexican Building was a very good exhibit of Mexican onyx, and exhibits of stone from South American States were scattered through the various exhibits.

Now, what we would like to see is not only an exhibit of building stone in keeping with the industry in its present magnitude, both in development and resources, but a proper exhibition of rock and clay products, which includes an endless line of building material. The time is here, too, when this building material is growing more important very rapidly, and it looks foolish to let an opportunity of this kind go by without properly exhibiting products of this kind.

Take for example the cement industry, and the world at large has but a hazy idea of its development and possibilities; and the same may be said of a number of other industries, and the world at large is not going to make any strenuous effort to become better posted in the matter, unless the people interested in these industries push them into notice.

We are here to do our share, and we will be glad to hear from any of the readers of ROCK PRODUCTS with suggestions looking to the end of an exhibit at the Louisiana Purchase Exposition, of which the industry may justly feel proud.

Let us hear from you.

A Lady Actively in Marble.

When we hear marble spoken of in connection with a young lady, it is more generally that slangy expression called "the marble heart," but according to the following story from the *Boston Journal*, they sometimes take an interest in the marble business proper, and in this instance it seems to have been done up exactly proper:

"The female promoter and business woman is coming to the front. Miss Jean G. Wiley, of Addison, W. Va., a schoolteacher by profession, also possesses much industrial acumen. She graduated from the State School of Indiana and went to teaching school. She went to West Virginia, attracted by marble deposits, and quietly took options. She interested Pittsburg and Chicago capitalists. Her options, together with others, have become the nucleus to wealth. The company controls vast deposits of marble. It has been named the Pittsburg and Elk River Building Stone and Marble Co. The company owns practically all the marble deposits in West Virginia, it is stated.

"Miss Wiley is not yet thirty, but is a woman of remarkable energy and of accomplishments. She is the authoress of a work on physical culture, has written poetry, which her friends admire, and is known as a composer of music, but her hobby is to succeed in business."

Reports from New York City state that the Consolidated Rosendale Cement Co., New York City, has recently acquired a number of cement properties in Ulster County.

It is reported that the Cumberland Hydraulic Cement Co., of Cumberland, Md., which is owned by Ackermans, of Plainfield, N. J., will soon build a cement plant on the West Virginia side six or seven miles from Cumberland.

Slate.

The Manufacture of Structural Slate.

Did you ever visit a slate mill? If you have, some of the things I am going to say are already familiar to you, but they will be none the less interesting, and if you have never visited a slate mill the chances are that you only have a very dim idea of how slate is worked, and of the many different uses it is put to aside from roofing. Roofing slate is made by hand and has no connection whatever with a slate mill.

The Equipment of a Modern Slate Mill.

An up-to-date slate mill is equipped with sawing machines, planers, lathes and various things of this kind that might, from their names, suggest a woodworking establishment, but really comes nearer being similar to the equipment of a modern stone mill—the main distinction is in the fact that it does not require near as heavy machinery to work slate that it does for working building stone. In fact, slate, in the sense of its manufacture and use, might be classed as occupying a position between ordinary building stone and wood, and when qualities becomes better known it will likely be structural slate, with its cheapness and good more widely used. It is only of late years that there seems to have been any decided effort to push the structural end of the slate business in a general way. What it will all amount to, time alone will tell. The men who are interested in the business say that there is nothing to prevent the demand multiplying, once it is properly known. However that may be, it is but right that the world at large should know more about slate as a structural material, and that is the purpose sought here.

Slate is not Formed in Thin Layers.

To save confusion, I want to correct an impression that is more or less general in the public mind about the constructive composition of slate. Many who are not familiar with this material confuse slate with shale. This error is so common that geologists are frequently called on to examine what is called a "slate" quarry, which proves to be merely a bed of shale. Because of the quality of cleavage in slate and its splitting readily into thin slabs, there seems to be a general impression that it is formed in thin layers and this impression I wish to corect at the outset.

Shale is formed in thin layers, and splits into sheets parallel to the stratification of the rock, being in fact a thinly stratified rock; while slate is to all appearance a solid rock. The line of clevage is in fact, never with the plane of the bed; the stratification is more frequently formed at an angle of near 45 degrees. The cleavage property of slate is the peculiar feature which has been the subject of much scientific discussion which need not be entered into for the purpose of this article, the idea here being simply to point out that a block of slate is a solid block, just like a block of granite or limestone with no stratification apparent in its make up.

The First Step in Milling Slate.

Then we have, when we start into the mill, a block of slate which is simply like a block of stone of any other kind, only it is slate stone. Usually the first step on a block of this stone through the milling process is the sawing machine. A slate sawing machine is constructed somewhat on the order of a woodworker's table or bench saw, only it has modifications to fit it to its specific use and it is of course, constructed on a heavier plan. It has a strong, rigid frame of iron and a traveling bed of the same material, which is perforated for the purpose of clamping blocks for sawing. The saw itself is, to all apparances, a regulation circular saw, except that it is extremely heavy. These saws range in size from 24 to 42 inches in diameter, and are usually very thick, running something like ¾ of an inch in thickness of blade, and the teeth are spread with a swage like the teeth of an ordinary saw, but the general shape of the teeth more resembles the cross cut, only they are dressed and filed square, just the same as a rip saw. We have but to refer to the old rule that the harder the material, the slower the speed to understand that these saws run very slowly. The schedule speed is 25 revolutions a minute for a 24-in. saw and 16 revolutions for a 42-in. saw.

Operating a Slate Saw.

In operation, the block is clamped on the table in the position desired, and the carriage is brought up to position by a special gear that makes the handling more rapid than if only a saw gear were available, and then the carriage is shifted to an automatic feed, which is in substance a slow force feed that carries the carriage along at the rate of about 6 in. a minute, the exact speed depending somewhat on the work in hand, there being three or four changes of speed. The machines are also provided with a quick return movement for running the carriage back to position after the block is cut.

With this explanation and a glance at the machines shown in the illustration, one can readily understand the general process of sawing slate. It is, as stated formerly, the same as sawing stone, only slate is not nearly so hard as any building stone, which not only enables it to be worked more rapidly, but permits the use of lighter machines.

Planing and Grooving Slate.

In slate planing machines there is some variety, just as there is in stone planers for general purposes. The machines are generally constructed on the general principle of an iron planing machine with cross head and traveling platen, the great distinction being in the cutters. The cutter for planing slate or stone is usually from three to six inches broad across the face. When we reach this stage of the process of working slate, however, it is a little difficult to explain the many changes that may be made in the work of the machine, except to such as are familiar with handling iron and woodworking tools, and it differs radically from woodwork.

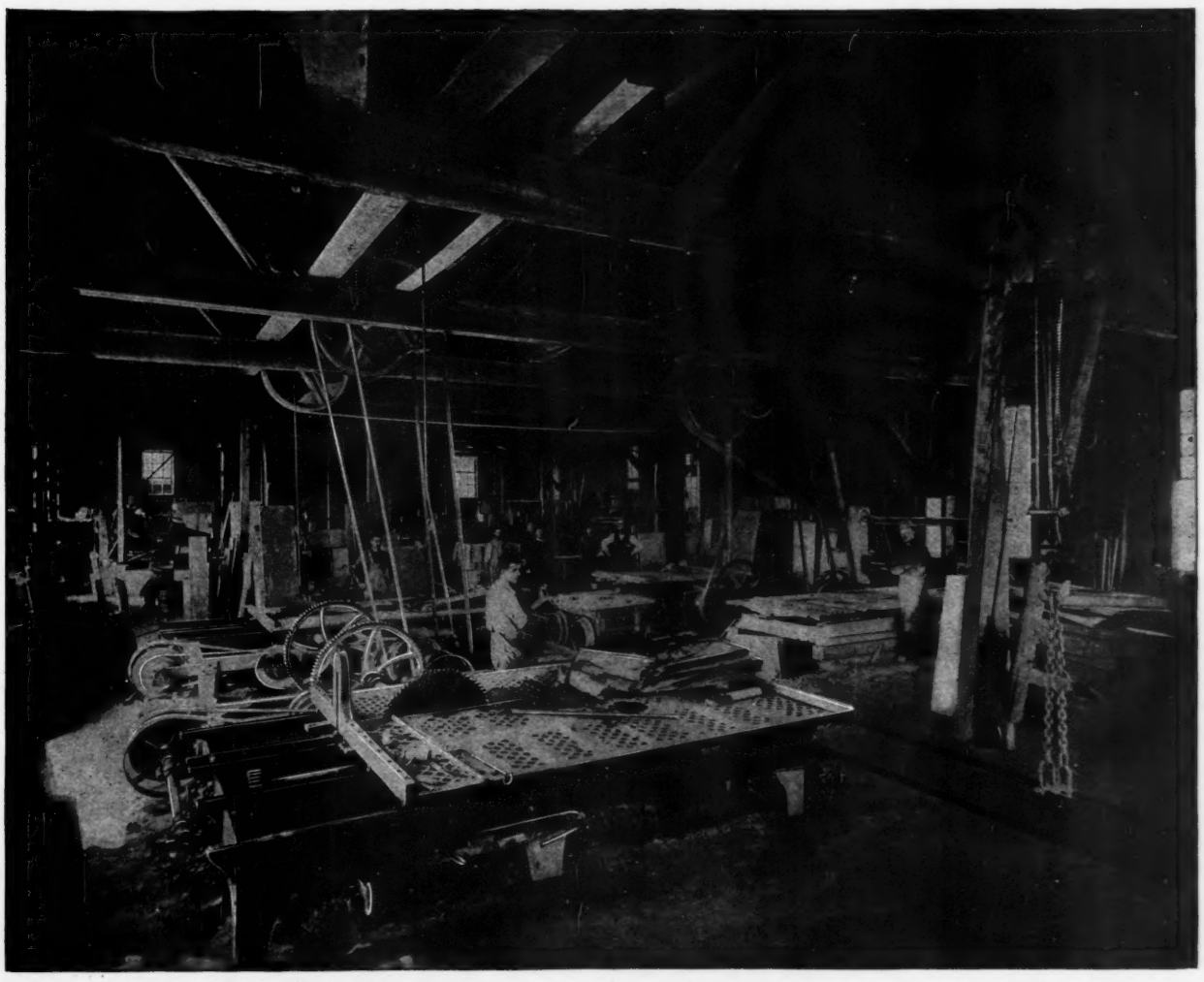
Take, for example, the matter of grooving across a slab of slate. In a woodworking institution this would come under the head of gaining, and would go to a machine for that purpose, while in working slate these planers are sometimes built with an attachment for cutting grooves either across or lengthwise. It is easy to understand how the attachment could be put on to groove lengthwise, because the platen in traveling back and forth gives the movement necessary for this work, but in grooving crosswise the platen necessarily is at rest, while a special attachment carries the tool and grooves crosswise. Aside from the grooving that is done on planers, there are special grooving machines, some operated by power and some by hand.

Lathes and Other Things.

They also have lathes in which slate can be turned almost as readily as wood, and made to the same variety of patterns. Examples of this are found in some of the elaborate slate mantels—not only of turning, but of carving.

Another machine of the slate mill is the rubbing bed, where surfaces are finished off perfectly smooth. This machine usually consists of a revolving circular platen of cast iron of various diameter up to sixteen feet, the general thickness running from three to four inches.

Then we have drilling and counter-sinking machines for putting screws through holes in slabs of slate and counter sinking them. We have also band saws for sawing slabs of slate to pattern, which reminds one of the regulation band saw used in a woodworking factory.



INTERIOR OF SLATE MILL—MACHINERY MANUFACTURED BY S. FLORY MFG. CO., BANGOR, PA.

Artificial Stone

Sandstone Brick Co. is one of the new industries of Saginaw, Mich., to manufacture artificial stone in the form of brick.

W. H. Fisher and C. E. Fitzgerald, of San Francisco, Cal., have been giving some demonstrations in Topeka, Kas., on the manufacture and use of artificial building stone. They have a plant for making this stone in San Francisco, and it is said the object of their visit to Topeka was to establish a plant at that place to instruct contractors in that part of the country in the material.

What is said to be a new departure in building circles is the construction of a concrete chimney at the works of Mitts & Merrill, Saginaw, Mich. The chimney is to be 90 ft. high, and its construction is now about half completed. At its base it will be 105 inches in diameter, and at the top 66. The interior of the chimney will be lined with concrete and the flue will be 36 inches wide. The chimney is being built for a new boiler house, and it is believed that it will be cheaper than the brick chimneys, equally it not more satisfactory, and also superior to the iron smokestacks.

The Best Cement, Brick and Moulding Co. (Ltd.) has been organized at Bay City, Mich., with a capital stock of $25,000.00. The incorporators are: Fred. Laughray, president; Edward Laughray, vice president; W. Jay Gould, secretary, and Robert Laughray, treasurer. All but Mr. Gould are residents of Bay City. The Laughray brothers are well known in the line of cement industry, having had charge of the work recently done on the Hecla plant and many other large contracts stand to their credit. Mr. Gould has been known as an organizer of incorporations, as well as being the State representative for the Selzer & Serr Brick Machine Co., of Corunna, Mich. The company has purchased four machines with a capacity of 8,000 bricks per day. The machines are adapted to molding any design or size of brick, and the mixing, coloring and cutting of the materials used in the process are all done at one operation.

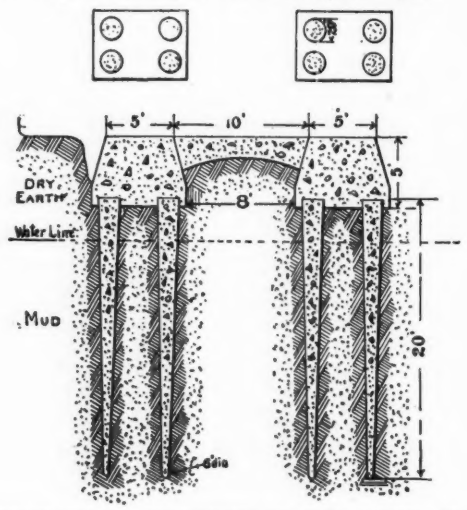
Bowman on Concrete Work.

John Bowman, of Peoria, Ill., has a hobby, which is artificial stone and concrete, and he has done extensive experimenting along this line. In reply to an inquiry in regard to the result of his experiments, he says: "I feel grateful that you consider the matter important enough to inquire for information in that line for publication, because as far as I can comprehend, the public in general is poorly informed about concrete and its uses. There can be no doubt that experience, though the hardest, is also the best teacher. I have been in the lime, mortar and cement school thirty-five years, have mastered the various trades requiring their use, and still feel unable to properly handle the subject. Several years ago I made up my mind that Portland cement, sand and gravel concrete was the coming building material, and that the main question was to get the best possible results from that at the least cost. I find that from ten to fifty per cent. of the cement in concretes is practically wasted through lack of knowledge and the proper appliances for making it. I find that the hardening process of Portland cement is entirely different from common cement. It does not set, as is supposed; but it crystallizes, or rather the silica does, and the other parts are only a vehicle for holding the mass together; therefore, the process of mixing and making should be different. I find that weighing the material and the water that is put into a given bulk of concrete is the best method to get their full value, and then press it to the proper size. Also that a proper grading of sand and gravel used increases its value for that purpose from ten to twenty per cent., and washing both sand and gravel increases its value twenty per cent. more. Grading and washing add from ten to twenty-five per cent. to the weight of any given bulk. I mention only a few of these points, as it would require considerable time and labor to cover the subject. I have also formulated and proved a plan for making stone for houses that can be made and kept in stock, so that a man can bring his plan to the factory or yard, buy the stone that will build his house, without fitting or breaking one and have none left. I have demonstrated that all this material can be made to compete with brick or stone in price, have a much better appearance, have any desired color and shape, and at a much greater profit than either; but it would require considerable capital to properly fit up for the purpose, and so far I have found that capitalists, as a rule, are pessimists in everything except their own business, and often in that."

Is Concrete to Replace Wood Piling?

And now it is not only concrete building, and concrete foundations, but concrete is beginning to crowd wood in the piling industry, and nothing but time will show what the end will be. Of course, the first thing the purchaser will look at is the item of first cost, and having this in mind when

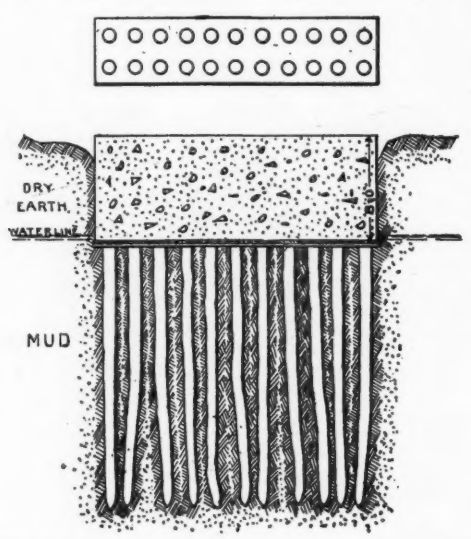
Top view looking down on concrete piles in piers.



View of concrete pile foundation put in for J. I. Case Plow Works at Racine, Wisconsin.

we saw the illustrated description of concrete piles made by the Raymond Concrete Pile Co., 913-935 Adams Street, Chicago, Ill., we wrote and asked them how it would compare in cost with wood pile, to which they replied as follows: "Our experience has proved that in a great many in-

Top view looking down on wooden piles in a running wall.



View showing construction had wooden piles been used in the J. I. Case Plow Works' foundation, the cost of which would have been fifty per cent. more.

stances we can put in a concrete pile foundation very much cheaper than the same foundation could be put in with wooden piles. We are able to make this saving, owing to the great taper on our pile, and to the fact that we can utterly disregard the water line, which in many instances is several feet below the basement level, thus saving much excavation and masonry. We have found that one concrete pile will carry as great a load as three ordinary wood piles of the same length." In their booklet on this same subject they say that ordinary wooden piles average about 12 inches diameter at the top, giving 113 square inches of surface. Concrete piles are 20 inches in diameter at the top, giving 314 square inches surface or 2,77 times that of the wooden pile. The taper of a wooden pile is only about 3 or 4 inches from top to bottom, while the taper of concrete pile 14 inches.

In comparing cost of a concrete pile to a wooden pile, persons usually take the cost of the ordinary wood pile, which runs from 11 to 15 inches at head, which will average about 12 inches after being cut off ready for the reception of grillage or concrete, while a fair comparison would be to take a wood pile of the same diameter of the concrete pile; consider what a wood pile which is 20 inches under the bark at the head would cost, then have it turned or hewn down to 6 inches at the point so that it would have the same carrying capacity, then compare the cost, which after being driven no doubt would be equal if not greater than the concrete pile in place. So in comparing you should either take a wood pile of the same diameter and taper of the concrete pile, or use enough more wood piles to get the same surface on top and same carrying capacity, which would be at least three to one; then if your basement is below water level you must add the cost of excavating and building of extra wall to where your wood pile will be submerged, to insure its premanency. Hence a fair comparison will in all instances favor the concrete pile, as to cost and durability of foundation.

With the matter of cost and carrying capacity satisfactorily settled, there are many points in favor of the concrete pile. One is, of course, that it is practically everlasting, and another is in that you can practically disregard the water line in construction; and in fact, there are many advantages that might be pointed out, and the development of the cement pile in the industry will be watched with interest, not only on its own account, but because of the scarcity of timber suitable for making first-class piles.

The manner of forming or making concrete piling is thus described: We first drive into the ground a sheet iron shell the size and shape of the pile desired. This is accomplished by fitting the shell over a steel core, which, encased in the shell is driven in the same manner as a wooden pile. A simple device permits the shrinking of the core so that it is then easily drawn. All that remains is to fill the shell with Portland cement concrete.

Production of Borax and Bromine.

The report on the "Production of Borax in the United States," by Dr. Joseph Struthers, in "Mineral Resources of the United States, 1901," now in press, United States Geological Survey, shows that there was a slight decrease in 1901, the output being 17,887 short tons of crude borax and 5,344 short tons of refined borax, valued at $1,012,118.00, as compared with the production of 24,235 short tons of crude borax and 1,602 short tons of refined borax in 1900. Of the output in 1901, California produced the whole of the refined borax and 16,887 tons of the crude borax.

The production of borax in the United States continues to be derived mainly from the colemanite deposits of California, although a small quantity is produced from the marsh deposits of California, Nevada and Oregon.

The imports of borax, borates and boric acid in the United States amounted to $56,683.00, as compared with $32,679.00 in 1900 and with $27,047.00 in 1899.

The Borax Consolidated, Limited (the international borax combination), now operating in the United States, England, France and South America, reports a very favorable business for the fiscal year ending September 30, 1901. This company is capitalized at £1,400,000, of which £800,000 is preferred stock carrying 5½ per cent. accumulative dividends, and £600.000 is ordinary stock, each of the par value of £10. The net profits for the fiscal year were £190,278, from which interim dividends of £22,000 on preferred stock and £30,000 on ordinary stock were paid.

There has been but little fluctuation in the price of borax during 1901, which remains at 7 to 7.25 cents for the refined and 6.75 to 7 cents for the concentrated product.

Bromine.

The production of bromide in the United States during 1901 amounted to 552.043 pounds, valued at $154,572.00, as compared with 521,444 pounds in 1900, valued at $140,790.00, an increase of 30,599 pounds in quantity and $13,782.00 in value for the year. The price per pound during 1901 averaged 28 cents, as compared with 27 cents in 1900 and 29 cents in 1899.

The production of bromine in the world continues to be controlled by the Associated American Producers and by the Leopoldshall-Stassfurt Convention, which is operative for several years to come.

Michigan continues to be the most important producer of bromine in the United States, followed by Ohio, West Virginia and Pennsylvania. A description of the various brines of Michigan which carry bromine has been given by Dr. Alfred C. Lane in "Water Supply and Irrigation," Paper No. 31, 1899, United States Geological Survey.

Monuments.

W. F. Womble has a new marble works at Dublin, Ga.

Miller Bros., Iowa City, Iowa, have moved into a new building.

Godden, Ballard & Sam have moved from Forest City to Estherville, Iowa.

W. F. Womble, Quitman, Ga., has opened up a marble shop at Dublin, Ga.

Frey & Johnson, of Crete, will go into the monumental business at Chicago Heights, Ill.

H. L. Foust is now interested in the monumental business with C. J. Billman, Logansport, Indiana.

Wm. Negle, Tiffin, Ohio, is receiving treasurer of a movement to erect a monument to Gen. Wm. H. Gibson.

The Madison Monumental Works, conducted by J. T. Hamilton, has been bought by Golden & Flora, Richmond, Ind.

Local G. A. R. and S. of V., of Bangor, Pa., have started a movement to erect a monument in that city to cost about $10,000.00.

Misho Bros. are building an addition to their plant and adding to the equipment of their granite works at Sauk Rapids, Mich.

Wm. O'Brien has sold the interest in his marble works at Pajaro, Cal., to T. H. Bliss, who will take an active part in the business.

Company E, Sterling, Ill., will erect a monument in Central Park of that city in memory of the dead of the Spanish-American War.

H. G. Spencer has become interested in the monumental business of Otto Fisk at Aurora, Ill., and the firm is known as Fisk & Spencer.

Meeker Bros., Newark, N. J., have been awarded a contract for the erection of a monument to the New Jersey soldiers that fell at Antietam.

W. L. Hertzer, cashier of the Tiffin (Ohio) National Bank, is receiving contributions for a monument to be erected to General Gibson.

J. C. Miles has bought out the interest of D. J. McDonald in the firm of D. J. McDonald & Co., and will continue the business personally.

The Columbian Granite Co., Montpelier, Vt., has recently added a new polishing wheel to its equipment, making three of these appliances in their plant.

St. Marys, Ont., Can., has taken steps to erect a monument to the memory of the St. Marys boys who lost their lives in the English army in South Africa.

Dille & Clemens, Greensburg, Ind., are building a new shop and sales room. The shop will be equipped with modern appliances for handling heavy work.

A committee, of which Wm. J. Kirby, of Albion, N. Y., is chairman, is raising funds to erect a monument in Holy Cross Cemetery, that place, to the late Rev. John Castaldi.

A. S. Johnson Camp No. 71 of the United Confederate Veterans, Greenville, Texas, is taking the initiative step in the movement to erect of Confederate monument in Hunt Co., Texas.

F. T. Murdock has associated with him in business at St. Johns, Mich., R. C. Davies, formerly of Davies & Adams, and the two mills will operate under the firm name of Murdock & Davies.

A committee, of which Jerry J. Lynch, of Butte, Mont., is secretary, will erect a monument in the capitol grounds of Helena, Mont., to General Thos. Francis Meager, to cost not less than $20,000.00.

The French National Monument Association, it is said, has decided to build on its lot at Appleton and Race Streets, Springfield, Mass. The building is to provide halls for their local French organizations, and several living partments, and the cost will probably exceed $50,000.00.

The department of Ohio G. A. R. is to erect a monument to General Wm. H. Gibson, and General Walton Weaver, department commander, Toledo, Ohio, has the matter in charge.

R. H. Carpenter, Bloomington, Ind., has opened up a branch marble shop at Lowell, Ind. The branch shop at Lowell will be in charge of Leroy Hayden, and has already a number of jobs on hand.

The Lone Fur Monumental Association, of which M. L. Pratt, Portland, Ore., is secretary, will erect a memorial to the soldiers and pioneers in Lone Fur Cemetery, Portland, for which $1,500.00 has already been raised.

The Lee Marble Co., Lee, Mass., has been increasing its force and opening up new sections of quarry. They have also purchased a new locomotive and have increased the number of cutters in their stone work.

A monument association has been formed at Mackinaw, Mich., with E. C. Amphlet, as secretary, to secure the erection of a memorial by the government to commemorate and mark the site of the Indian massacre in 1763.

Stephenson Post, G. A. R., Springfield, Ill., has appointed a committee to take steps for the erection of a suitable monument on the ground set aside in the Oak Ridge Cemetery for the soldiers and sailors of the Civil War.

The mausoleum recently erected to the memory of Colonel D. L. Cockley, at the Oakland Cemetery, Shelby, Ohio, is said to be the first strictly private vault erected in that city. It is built of gray limestone and has room for twelve bodies.

Sullivan, Tucker & Co. have leased the granite working plant formerly operated by I. N. Bates & Co., East Barre, Vt., and are putting in air compressors, pneumatic tubes, and are preparing to do all kinds of monumental work.

Crooks & McLain, Carthage, N. Y., have secured a contract to erect a soldiers' monument, costing $2,700.00, at that place. The monument is to be of No. 1 Barre granite, of medium color, and is to be erected and ready for unveiling on or before April 15, next.

The Capitol Hill Granite and Marble Co., Des Moines, Iowa, recently opened up in its new place of business, 618 East Locust Street. The growth of their monumental business is a reward for efforts to supply the best monuments from the best material and quoting honest prices.

At a recent reunion of the First New York Dragoons, a committee was appointed with Dr. D. W. Harrington, Buffalo, N. Y., as president and treasurer, to raise funds for a monument to be erected at the camp grounds at Portage, where the regiment was mustered into service in 1862.

Drs. Elias Davis, D. R. Tolley and John C. Legrande, of Birmingham, Ala., were appointed a committee at a recent meeting of the Jefferson County (Ala.) Medical Society to raise funds for the erection of a monument to Dr. Jerome Cochran, the founder of the Alabama Medical Association.

The Goebel Monument Commission met at Frankfort, Ky., September 9, and in going over the funds collected for the monument, a check for $1,000.00 was received from Mrs. C. C. McCord, making the total now $15,000.00. The commission is to meet again November 18, when the contract for the monument is to be let.

At the annual meeting of the Cape Cod Pilgrim Memorial Association, recently held at Gloucester, Mass., fresh energy was given to the movement to erect a monument on the outer point of Cape Cod in honor of the Pilgrim compact of government. The secretary of the association is Osborne Nickerson, of Chathamport, Mass.

Miller & Clark, Americus, Ga., have a contract to erect a $10,000.00 monument, which the State of Pennsylvania will erect in honor of the Pennsylvania dead soldiers in the cemetery at Andersonville, Ga. The One Hundred First and the One Hundred Third were taken prisoners almost as a whole at Plymouth, N. C., by the Confederates during the Civil War and sent to Andersonville, where many of them died, and it is in honor of these the monument is erected.

Reports from St. Catherines, Can., state that the Mackintosh Granite and Marble Co. is erecting a monument in Lawn Cemetery, St. Catherines, of Barre (Vt.) granite, which is one of the handsomest memorials ever erected in that part of the country. The monument was erected by Mrs. Batty, in memory of her husband, the late J. H. Batty, president of the Federal Life Insurance Co. of Canada.

Speaking of the sarcophagus to the memory of John Sherman and Mrs. Sherman, which is being placed in the Mansfield (Ohio) Cemetery by E. M. Wolff & Co., of that city, a local Mansfield paper says that it will be severely plain in type, constructed of Westerly, R. I., granite, and will weigh something over thirty tons. The memorial consists of a sub-base, which alone weighs 12 tons and is 8 by 12 ft.; a molded base and die. It will be 8 ft. high and there will be Romanesque carving on the die and base, but the monument otherwise will embody the plainly severe type of memorial.

There is a movement on foot in Washington, D. C., to erect a statute to Alexander R. Shepherd, the late governor of the District of Columbia, who died in Mexico the early part of September. Henry McFarland, district commissioner, is reported as saying: "A statue of ex-Governor A. R. Shepherd should be erected in the city of Washington by popular subscription. Much of the wealth, as well as much of the beauty of the national capital, we owe to Governor Shepherd, and it is appropriate that we should show our gratitude in tangible and permanent form. It was supposed to erect a statue of Governor Shepherd before his death, but there was an indisposition to make an exception to the rule against giving such an honor to a living man. There can be no possible objection to giving him this honor now."

The Lee Marble Co., Lee, Mass., which was dissolved by the death of Francis L. Gross, one of the principal stockholders, August 30, has been reorganized by Chas. H. Gross, of Philadelphia, and the work will go on as usual. It is said that they recently received a contract for 9,000 soldiers' headstones, and they have an old contract yet along the same line. Of the work of the company at the quarry, it is said that the recent uncovering of stone east of the big quarry shows that there is a splendid deposit of stone running north from the old Philadelphia quarry under the power house and extending from the present quarry on the east. Considerable work has done toward removing the rubble and from present indications the day is not far distant when one of the finest floors of marble ever seen in this country will be opened for operation.

The Flower Statue at Watertown, N Y.

The Woodbury (N. Y.) Granite Co., as well as others connected with the erection of the Flower statue at Watertown, N. Y., is paid a compliment by one of the local papers, which described the work as follows: "The result is a fine effect from an artistic standpoint as well as a work that will stand through centuries unless shaken by some tremendous upheavel of nature. It is a striking example of the rich and beautiful material that lies under the ground in Vermont. Herbert L. Brown, the company's representative, who has been in Watertown since the material arrived here, has received many compliments for his concern.

"The material used is Bedford syenite, which in its construction is similar to the Egyption syenite (from which the Egyptian obelisk in Central Park, New York, was executed), but in grain it more closely resembles Numidian marble.

"The die weighs 16,000 pounds and in the rough it weighed 25,000 pounds.

"In order to complete the die on time, workmen were engaged on it for twenty-four hours each day for the last month and sixteen hours during the previous month.

"The curb is fine-hammered while the base and die are hand-rubbed.

"The rubbed surface is preferred to the polished on the best class of stonework, as it is on the finest grade of interior woodwork.

"Monumental setters were sent from New York to erect the work under 'Pat' Phillips' supervision, and no expense spared to have the work executed on time and to have the workmanship of the very best known to the trade.

"The eagles could not be carved in time, so that the models had to be painted and used for the dedication.

"The pedestal was designed by the well-known firm of architects, Brite & Bacon, of New York, who have received many advantages in this class of work from their extended study abroad.

"The granite work was executed by the Woodbury Granite Co., of 7 East Forty-second Street, New York, which own quarries of different granites and are familiar with this class of work as well as with large building work, their Woodbury White quarry having produced some of the largest monoliths ever erected.

"The carving was executed by the well-known firm of sculptors, Buehle & Lanter, of New York."

Clay.

Mining and Washing Kaolin

In the census report of the clay industries, the value of C. C. (or cream-colored) ware produced is $1,540,488.00; white graniteware is $1,787,101.00; chinaware (porcelain) $1,255,978.00. Of the raw material used in this work, we find china clay (kaolin) domestic, $390,804.00; china clay form, $171,790.00. Of the domestic kaolin when we turn to the special bulletin concerning North Carolina we find under the head of kaolin and earth grinding that this State produces, $105,929.00. This bears out the statement made in the reports of the North Carolina Geological Survey that North Carolina is one of the important producers of this material with principal factories at Trenton, N. Y., and East Liverpool, Ohio.

The Properties of Kaolin.

It is probably in order before discussing at any length kaolin and its manufacturers to point out that kaolin is the name used to represent pure clay, or rather that highest grade of clay which is as nearly as pure as is to be found. If forms the basis of all clays, the degree and nature of purities found in connection with it making up the different grades of clay used in the various industries. Kaolin of good quality is pure white when washed and dried, but often gray when wet.

In plastic qualities kaolin is usually very lean, although some crude kaolins feel plastic when taken in hand. The tensile strength is low, varying from 5 to 20 tons per square inch. Because of this leanness, kaolin is mixed with ball clay in the manufacture of china to give it plasticity. Feldspar is also used as a flux and quartz is added to prevent excessive shrinkage during the process of burning.

How the Mining is Done.

Kaolin is usually soft enough to be mined with a pick and shovel, and in some places, especially when it is to be mined from a depth, hydraulic mining is frequently resorted to, which consists substantially in washing the clay down in the pit or shaft and then pumping the mud or slurry made of combined water and clay to the washing trough by the means of pumps. As a rule, kaolins are washed before being shipped to the potteries to eliminate coarse particles of sand, iron, etc. There are different methods of washing clay, but the following is given as a general rule followed in North Carolina:

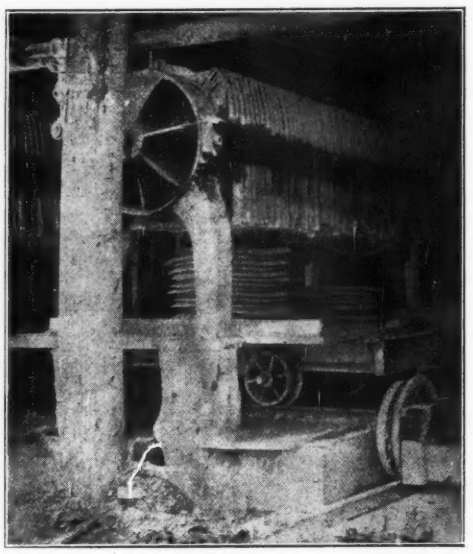
As the kaolin comes from the mine it is generally discharged into a log-washer. This consists of a semi-cylindrical trough, in which there revolves a horizontal axis bearing short arms. The action of these arms breaks up the kaolin more or less thoroughly, depending on its density, and facilitates the subsequent washing. The stream of water directed into the log-washer sweeps the kaolin and most of the sand into the washing troughs, which latter are about 15 inches wide and 12 inches deep. They may be wider and deeper if the kaolin is very sandy; in fact, they should be. The troughing is about 700 feet long, and to utilize the space thoroughly it is broken up into sections (50 feet each in a good length), these being arranged parallel, and connecting at the ends, so that the water, with suspended clay, follows a zig-zag course.

The Washing Process.

This trough has a slight pitch in North Carolina plants, being about one inch in 20 feet, but this is a matter depending on the kaolin. If the kaolin is very fine and settles slowly, the pitch need not be so great, and *vice versa*. A large quantity of every coarse sand in the kaolin is a nuisance, as it clogs up the log-washer and upper end of the trough more quickly, and causes so much more labor to keep them clear. As it is, considerable sand settles there, and, to keep the trough clear, sand wheels are used. These are wooden wheels bearing a number of iron scoops on their periphery. As the wheel revolves these scoops catch up a portion of the sand which has settled in the trough, and as each scoop reaches the upper limit of its turn on the wheel, by its inverted position, drops the sand outside of the trough. These sand wheels are a help, but it is very often necessary to keep a man in addition, shoveling the sand from the trough. After washing and being allowed to settle, the settling is sometimes assisted by the use of alum. All the water possible is drawn off and the cream-like mass of kaolin and water that is left is pumped into presses. The presses for this purpose consist of a series of flat iron or wooden frames, between which a flat canvas bag is placed that is connected with nippers to the supply pipes and pumps. The pressure from the pumps serve to force out most of the water through the canvas bags. When all the water possible is gotten out the sheets of semi-dry kaolin are rolled up and put

KAOLIN WASHING AND DRYING PLANT OF THE HARRIS CLAY CO., NEAR WEBSTER, N. C.

on racks to dry, either in the open air or dry house. It is estimated that only about a quarter of a ton of washed kaolin will be obtained from a ton of crude material, and this is of itself sufficient reason for having a washing plant at the mines for the handling of all this waste material that add materially to the cost of kaolin if it were shipped to the factory unwashed.



FILTER PRESS FOR REMOVING WATER FROM WASHED KAOLIN.

In the matter of condemnation proceedings instituted by the B. & O. Railway Co. against the Baltimore Brick Co., to condemn about seven acres of land in the vicinity of Riverside Bank, Baltimore, Md., the jury awarded a contract amounting to the sum of $50,000.00 for the property.

The Empire Brick Co. has been incorporated with a general office at 874 Broadway, New York City, with a capital stock of $1,500,000.00, for the purpose of manufacturing, freighting and supplying brick to builders. The officers of the company are: Wright D. Goss, president; W. H. Edsell, secretary-treasurer; Jerome Walsh, general manager, and Elijah Walsh, assistant manager. This company takes over the property of some well-known brick concerns of New York, including two plants owned by Goss & Edsell, and it is said they will erect a couple of large plants.

With the Chicago Clay Workers.

CHICAGO, ILL., September 23.—A number of scientific men, aided, it is said, by the chemical department of the Chicago University, have taken up a matter which is of more than passing interest to all connected with the brick industry here. Readers of history will probably remember that in rebuilding Paris, Napolean III found many of the splendid structures erected by him had become badly disfigured by a saline exudation, which formed a white crust on the outside of the brick walls, greatly marring the beauty of the structures. Thereupon, the French Government offered a reward of $100,000.00 to any person who would discover a remedy for this disfiguration of brick walls. This reward has never been claimed, but this is the problem the scientific men of Chicago have taken up, with the view of solving, not for the sake of the reward, but for the good of the public.

Chicago brick is no more free from this trouble than any brick in this country. Brickmakers and bricklayers, as well as building contractors, will be glad to see the difficulty overcome, but many of them appear to doubt the efficacy of any remedy that has so far been proposed. The trouble is not altogether confined to the walls, or in other words, the fault can not be laid to the location or the surroundings of walls, because I visited some brick yards in the suburbs, where piles of new bricks, which had not been in contact with mortar, but remained in a comparatively pure atmosphere since leaving the kilns, showed this same white incrustation.

In many of the new buildings of this city when the bricks become wet from a storm, the salty compound in the bricks dissolves, and in the dry weather succeeding the storm, the solution evaporates from the surface of the bricks, leaving them coated with an unsightly white coating. In fact, in some portions of the city, handsome blocks, or fine whole blocks, have so "run down" within a single year as to be objectionable to desirable tenants, while otherwise no other fault could be found with the building. It seems, too, that this exudation is encaustic, for attempts to hide it by paint are seemingly useless, as it makes its appearance, having eaten itself through the thickest application of paint.

A man down in Indiana has recently taken out a patent on a remedy, consisting of one part beeswax, three parts paraffine, three parts Venice turpentine, one part dissolved glue, one part raw linseed oil, and three parts coal oil, which was mixed hot and applied to bricks or stone. It is claimed that this coat is waterproof to prevent the exudation of any saline substance that may be contained in the building material. I am not authentically informed, however, as to the results of an experiment with this material.

The plan of the scientists are at work on, which seems to be the only line for a successful remedy as in working on the clay that composes the brick, so as to thoroughly eliminate those qualities, or render them absolutely inert before the brick is made.

The discoloration of cemented brick buildings by this exudation has led many builders to select stone in place of brick, and it seems that nearly all fancy brick work has been fated for disfiguration in this matter, which, of course, handicaps the use of ornamental brick to some extent. In some instances terra cotta has been used to supplant brick, but even this material is not always free from some trouble. In fact, some of the structures built of terra cotta seems to be as bad as the brick buildings referred to. This trouble has been the source of quite a lot of worry to terra cotta manufactures in this city, for this is a notable industry here, one of the largest concerns of the country being located at this place. Great progress has been made in the manufacture of this material during the last two decades, until now the manufactures have reached the point of high artistic talent, and the industry is ranked among the fine arts. The business has also proven a profitable one, and is being pushed forward to attain even greater things, both in quantity and quality of finish.

The Eureka Brick Co., has been organized at Grand Rapids, Mich. to extend the brick business, started last month by H. N. Wilder and A. H. Brown. The new company is capitalized at $250,000.00, and associated with Messrs. Wilder and Brown of the new company are Geo. L. Davis and M. V. Bosch. The present plant has a capacity of 40,000 a day, and it will be enlarged as the output increases.

HERE AND THERE IN THE CLAY FIELD.

The Reed Nichols Co., Bath, Me., is burning 700,000 bricks.

The Slater Brick Co. is establishing a brick plant near Billings, Mont.

W. G. Hunt and H. A. Kohler will open up a brick yard at Sandpoint, Idaho.

The Thomaston Brick Co. is erecting a brick plant near Camden, Me.

The Brant Clay Brick Co. will rebuild its plant at Binghampton, N. Y., this winter.

John Baeten, of Depere, Wis., has sold his brick yard to Peter Baeten, Green Bay, Wis.

The American Clay Co., of New Jersey, is preparing to operate a brick plant near North East, Md.

The Lockhart & Luling Brick Co., Lockhart, Texas, lost its brick kiln by fire early in September.

The Suburban Brick Co., Wheeling, W. Va., will enlarge its plant, enlarging the present capacity.

The Dale Brick Co., Des Moines, Iowa, is reported as enjoying a good run of business this season.

The Concord Brick Co. has been incorporated at Natchez, Miss., with a capital stock of $10,000.00.

The Millhall Prospecting Co. has been organized at Millhall, Pa., to develop fireclay and coal property.

The Lafayette Brick and Tile Co., a new concern at Lafayette, La., began operations early in September.

The Ferguson Brick Co., Troy, N. Y., is putting in a new Standard dryer and otherwise improving their plant.

C. B. Ramsey, a paving contractor of Topeka, Kas., is figuring on establishing a brick plant at Fort Scott, Kas.

The Excelsior Firebrick Co. has been incorporated at Chicago, Ill., by A. T. Griffin, W. A. Herrick and P. P. Menard.

Reports from Fresno, Cal., state that the brickmakers over there have advanced the price of brick from $6.00 to $8.00 a 1,000.

The Flint Brick and Coal Co., Des Moines, Iowa, have been rushed all season with orders for paving brick and also for building brick.

It is said that Fields Bros., of Eddystone, Pa., contemplate leasing the old Price brick yard at Chester, Pa., and putting it in operation.

The Anacostia Brick Co., Anacostia, D. C., has been planning some inprovements to its brick plant, but the matter has been delayed.

The Sioux City Brick Co. has moved its office and mill location on Jackson Street, Sioux City, Iowa, to its works on North River Side.

L. L. Stephenson has completed his brick works near Leeds, Ala., and now has five down-draft kilns, and expects to make 50,000 bricks a day.

The Sparta Brick Co. has been incorporated at Sparta, Ill., with a capital stock of $2,000.00 by P. J. Sexton, F. E. Pinkerton and C. F. McLaughlin.

The Nelsonville Brick Co. has been incorported at Nelsonville, Ohio, with a capital stock of $50,000.00. James Dew and others are the incorporators.

The Table Rock Clay Co., Table Rock, Neb., have bought additional clay property, and it is said they will likely erect another brick plant in the future.

Geo. Cook, who has been connected with the brick business at Newfield, N. Y., for a number of years, will go into the brick business for himself at Ithaca, N. Y.

The New Jersey Tile Co. has been incorporated at Trenton, N. J., with a capital stock of $50,000 00 to manufacture tile. The incorporators are James H. Robinson and others.

The Reynoldsville (Pa.) Brick Co. has been incorporated with a capital stock of $25,000.00. The incorporators are: A. O'Donnell, Henry Herpel, G. W. Lenkerd and others.

The Standard Fireclay Co. has been incorporated at Fallston, Pa., with a capital stock of $35,000.00. The incorporators are: Joseph H. Edwards, Rochester; —James Garrett, Monaca; and John W. Edwards, New Castle.

The Kelly-Deen Brick Co. has been incorporated at Winchester, Ind., with a capital stock of $10,000.00. The incorporators are: C. J. Kelly, L. D. Kelly and P. E. Goodrich.

The kiln sheds and a quantity of wood at the brick yard of Frank Diechsel, near Wausau, Wis., was destroyed by fire during the past month, entailing a loss of $1,500.00.

The New Boston Brick Co. has been incorporated at New Boston, Tex., with a capital stock of $20,000.00. The incorporators are: T. A. Fuller, H. A. Burrows and Louis Kapp.

The Goshen Brick Co. has been incorporated at Goshen, Ind., with a capital stock of $10,000.00. The incorporators are: A. J. Irwin, C. H. Crowell, H. C. Dangler and Charles W. Miller.

The Bell Pottery Co., Columbus, Ohio, has awarded the contract for their new buildings to Gorman Bros., at Cleveland. The superintending engineer will be H. M. Gates, of Columbus.

The American Brick Co., manufacturers of ornamental brick from sand, at South Hadley Falls, Mass., have recently added a new machine to their plant with a capacity of 10,000 bricks a day.

The Eureka Brick Co., which has recently been incorporated, will operate the brick industry upon lands of Henry L. Wilder, Grand Rapids, Mich. The new company is capitalized at $250,000.00.

The Moline Manufacturing Co., Moline, Ill., has installed a new brick kiln, and among their new products is a light colored brick for exterior finish, which it is thought will prove a favorite.

It is reported that A. J. Keeble, of Peterborough, Eng., has a patent for a process of brick making in England, Germany and the United States, which develops the natural color in brick externally and internally.

J. H. McKnight has disposed of his clay bed near Corona, Cal., and has associated himself with the Los Angeles Pressed Brick Co., which has recently erected a plant on what is known as the Santa Anna Canyon.

The Youghiogheny Brick and Supply Co. has been incorporated at McKeesport, Pa., by J. G. Patterson, Pittsburg; C. E. Patterson, J. P. Patterson, R. L. Raynor, McKeesport; A. W. Osborne, West Newton.

The Reynoldsville Brick Co. has been incorporated at Reynoldsville, Pa., with a capital stock of $25,000.00. The incorporators are: A. O'Donnell, Henry Herpel, G. W. Lenkerd, C. C. Gibson, J. H. Murray, H. L. Hoke, Reynoldsville.

The Champion Brick Co. is building a new plant at Wellsville, Ohio, which, it is said, will be in operation November 15. Its kilns are being pushed to completion, in order to take care of some orders, and ten more kilns will be added later.

The National Pottery Co. has been organized at Evansville, Ind., with a capital stock of $100,000.00. The incorporators are: M. D. Helfrick, C. A. Kahn, F. W. Kingsbury, A. M. Welti, W. T. Gleaves, H. F. Weaver and Adams Helfrick.

The Clay Center Brick Co., Clay Center, Kan., has completed its brick plant and is turning out brick at the rate of 20,000 a day. It is said also that the plant will likely be enlarged in the near future, as the demand is already in excess of the capacity.

The Asbestos Enameled Brick Co. has been incorporated at Cleveland, Ohio, by Dr. H. W. Kitchen, C. L. and E. C. Kelley and others. The company contemplates the manufacture of brick, in which asbestos enters into a part of the raw material.

The Rome Halloysite Co. has been incorporated at Rome, Ga., with a capital stock of $10,000.00, to develop clay and mineral deposits. The incorporators are: J. H. Dukes, J. C. Lau, E. J. Magee, J. W. Rounsaville, J. A. Rounsaville and H. H. McClure.

The Bell Pottery Co., Columbus, Ohio, has placed a contract with the Rahrig Engineering Co. for steel roofing, etc., for their kiln sheds. The company is also surveying a town, to be called Bellwood, and will soon start to work building houses for the workmen.

The Columbiana Clay Manufacturing Co. has been incorporated at Pittsburg, Pa., with a capital stock of $300,000.00 to mine, mill and deal in clay products. The incorporators are: H. J. Lawrence, Pittsburg; Daniel C. McCurdy, Sheridan, Pa.; Louis T. Pfarr, Rogers, Ohio.

Salt.

A Colorado Salt Field.

In the middle of the Colorado desert, a little to the North of the Mexican border, and 264 feet below the level of the sea, lies a field of crystallized salt more than a thousand acres in extent, presenting a surface as white as snow, and beneath the noonday glare of the sun so dazzling that the naked eye can not stand its radiance, it stretches away for miles and miles above Salton, California, an ocean of blazing, blistering white, says the *New York Tribune*.

Here daily throughout the year men are at work overturning the great deposit with massive plows and scrapers, getting it into great piles preliminary to putting through the refining process. The salt plows used to secure the harvest are great four-wheeled implements, driven by steam and managed by two men. The salt crust is thrown up in parallel ridges, then laborers with hoes work it to and fro in the water, washing out the dirt, preliminary to stacking it in mounds to be taken to the mill.

Salt springs in adjacent foothills are constantly contributing to the deposit, and so heavily laden are they with almost pure salt that the plow has hardly passed on before a new crust has formed in the furrow left. This fact renders it unnecessary to operate more than a small portion of the vast deposit. At present only ten acres are worked.

As may be supposed, work in these fields is performed under the most trying conditions. No white man can stand the intense heat, and for this reason the work is done wholly by Japanese and by Coahuila Indians. Of these the Indians are by far the better adapted to the work, the Japanese performing only one portion, sewing the sacks in which the salt is shipped. The atmosphere, laden as it is with particles of salt, gives rise to a painful thirst, and the only available drinking water comes from a single well. It is warm and ill-tasting.

Beautiful mirages frequently appear above the great salt fields in the daytime, sky pictures of magnificent cities and flower-dotted, tree-shaded fields. The moonlight, too, produces wondrously beautiful effects upon the great field of gleaming salt. For several weeks in the year the thermometer on the salt field averages 140 degrees, and the reflection of the sun produces a glare like that from a furnace. The deposits vary in thickness from ten to twenty inches, and form a solid crust over the great marsh. It is estimated that about 700 tons are now plowed up daily.

The American Salt Co. has put down a salt well at Belle Isle, La.

Geo. A. Baker, J. Craig Smith and John H. Ruhlman, of Youngstown, Ohio, are interested in a project to develop salt mines at Barberton, Ohio.

Harry Shuman, Fowler, Ind., has been conferring with the Chamber of Commerce of Wichita, Kas., with a view of carrying on some prospecting for that city for salt.

According to the New York *Commercial*, the National Salt Co. is in for an unpleasant round. Whether or not the tangle will be straightened out in good shape, we can not say at this writing, but it seems that this company is unable to meet some obligations, and an investigation is being made into its affairs.

The Ellsworth Salt Co., which was recently organized at Ellsworth, Kas., with a capital stock of $50,000.00, have secured a location at that place, and are now engaged in the erection of a four-pan evaporating plant which is to have a daily capacity of 400 barrels. A plant for the manufacture of fine table salt will also be erected. The following board of directors were recently elected: H. Work, president; R. F. Malaby, vice president; Geo. T. Tremble, secretary; B. S. Westfall, treasurer; John A. Lang, W. D. Jellison, M. L. Meek and Andrew Kipp.

Asphalt.

ASPHALT FORMATIONS.

Some Interesting Matter Relating Particularly to the Asphalt Formations of California.

The California State Mining Bureau published in 1899 a bulletin covering the subject of petroleum and asphaltum in that State, which, though going exhaustively into the matter of geological formations, too much for the popular mind to follow all the way through, nevertheless contains in patches here and there some of the best matter on this subject we have ever seen. It is a difficult problem, however, to select sections here and there from an exhaustive work and make-up in a condensed form the substance of the whole matter, but we can not resist an effort at it, and give the following, which is condensed from the bulletin: Six miles west of Santa Barbara, on the Calera Rancho, and on the ocean shore, an area of twenty acres has subsided some twenty-five feet; of this subsidence, four feet occurred in five years. This subsidence has occured through the contraction of the shale. The surface of the subsidence is rifted and seamed, and from these rifts and seams sulphurous and other vapors ascend. The ground is hot. The bluff is composed of burnt shales, showing tints from a cream color to a brilliant red. Water containing salt seeps from the base of the bluff. Shales with carbonaceous material, shales saturated with bitumen, and smoky looking shales surrounded the hot places. Near the hot places, heavy petroleum oils ooze through the shales. To the Eastward and Westward heavy and thick petroleum tars ascend through the cracks and seams and joints of the shale. Some of the seams of shales, containing a small proportion of bitumen, have hardened to such an extent that they resemble dark flint, and will cut glass.

How Asphalt Lakes Are Formed.

Lyell gives the following: "Captain Mallett quotes Guinillar as stating in his description of the Orinoco, that about sevently years ago a spot of land on the Western coast of Trinidad, near halfway between the capital and Indian village, sunk suddenly, and was immediately replaced by a small lake of pitch, to the great terror of the inhabitants." A similar subsidence at an early period may probably have given rise to the great Pitch Lake of Trinidad, the cavity having become gradually filled with asphalt. There are a number of places in California near these red shales from which natural gas issues. Some are hot, showing that they are formed at a high temperature. The formation of the Island of Trinidad consists of clays, loose sands, shale, limestones, calcareus sandstone, indurated clays, porcelanites of brilliant red colors, with pitch deposits and lignite here and there.

The only substances containing sufficient carbon and hydrogen for the formation of asphalt, and likely to be inclosed in the strata, are vegetable remains. They are particularly abundant at La Brea, where most of the asphaltic beds have been originally carbonaceous and lignite shales. Mineral springs abound throughout the island. In a series of loose sands, clay and shale, lies Pitch Lake, seemingly occupying a depression in the strata. To the Southwest of the lake the shore is made up of bold cliffs, the strata of which consists of indurated clays. They also present thick veins of porcelain jasper. Strata of loosely coherent sandstone also abound, some of which are impregnated with bitumen. Rounded pebbles of pitch and porcelain jasper form a batch at the foot of the cliff. A species of coke is occasionally observed along the shore, with a porous structure and the prismatic form of the artificial product, but, of course, much denser on account of the large proportion of earth. Near the lake is a red, yellowish substance, semi-baked, evidencing that a considerable degree of heat attended its formation. Part of the impurities in the Trinidad asphalt consists of comminuted red clays or shales, with some sand.

It is evidently not adventitious at the surface, but must have been thoroughly incorporated and brought up from the depths with the bitumen, judging from the constant amount, dissemination, and character in all parts of the deposit. Water, containing all the mineral ingredients of strong thermal water, is found in the Trinidad asphalt. The presence of borates, iodides, and so many forms of sulphur compounds, and other characteristics, show that the water must be of the same origin as that of many thermal springs. This water, in all unaltered pitch, shows that the formation of the pitch and water must have been simultaneous, and can not be considered adventitious.

Some Phenomena of Asphalt Formation.

It would be impossible for water, in any adventitious way, to become intimately mixed with the bitumen, so as to form practically an emulsion. Near the center of the lake is a body of pitch softer, blacker and newer than that of the remainder of the lake. Gas constantly issues from the cracks in the bitumen. These phenomena show that asphalt is being distilled at the present time. The porcelanite and red shales must have been formed by heat created in the strata themselves, as these shales are burned uniformly, in no place showing a greater degree of heat than in another. They are probably formed in the same manner as similar rocks in California. The depression in which Pitch Lake lies was probably made by the subsidence of the surface of the earth, caused by the heat contracting the underlying shale. There was no focus to this heat, no central point. If there was in the material next to the central point the evidence of heat would be great, gradually decreasing as you went from the focus; this is not shown. To illustrate, bricks of every different qualities are to be found in the same kiln, for as the fire is applied below the arches, the lower bricks in their immediate vicinity will be burnt to great hardness, or, perhaps, vitrified; those in the middle will be well burned; and those on the top will be too little burned. Even then the bricks the farthest from the fire would not have been burned to this extent, if it were not for the numerous flues left between the bricks in the construction of the kiln. The intense heat of a furnace is confined by a footwall of firebrick. Three feet of lava will confine the heat of the melted rock underneath. From the uniform burning of these shales, the heat must have originated in the shales themselves. A good, clean red heat is required for the burning of brick; it is fair to suppose that this temperature is required to produce red shales.

(Continued next month.)

The Barber Asphalt Co. had a small fire in its asphalt plant at Utica, N. Y., recently.

The Ayres Asphalt Co. has started to do some asphalt paving at Pierre Marquette, Mich.

The Barber Asphalt Co. recently received a contract for doing some paving at Grand Rapids, Mich.

The Memphis Asphalt and Paving Co. has secured contracts to do some asphalt paving at Memphis, Tenn.

It is said that liquid asphalt has been produced while boring for oil at Princeton, Ind., at a depth of a little more than 1,000 ft.

What is claimed to be a superior quality of asphalt has been discovered on the Cannonball River, South of Dickinson, North Dakota.

The bursting of a kettle of boiling asphaltum at the refinery of Griffith & Balk, Los Angeles, Cal., started a fire in their plant recently, and did about $1,000.00 worth of damage.

There is a report current originating in Los Angeles, Cal., that the Pacific Oil and Transportation Co. has sold the Lisquoc asphalt mines in Santa Barbara County to an Eastern syndicate.

President J. A. Woodson and Secretary D. B. Price, of the Arkansas Asphalt Co., Little Rock, Ark., made a trip out to their asphalt mines in Pike County recently and put a force of men to work digging out asphalt for some paving contracts they have on hand.

The Interstate Construction Co. has been hampered somewhat in its paving work at Fort Wayne, Ind., by the recent destruction of their asphalt plant in Kentucky by fire, which cut off their source of supply. They seem to have things going again and are at work both in getting out asphalt and in laying pavements.

Fertilizers.

Some Government Fertilizer Projects.

Reports from Washington state that the United States Government is becoming interested in importing from Egypt a plant called berseem, to use it in fertilizing arid lands. In this connection they state that where land has had no rain for centuries a salty deposit gathers near the surface. The scientist knows exactly why this is so, but it is hardly worth while to explain. When these arid lands are covered with water the first result is the formation of a salty crust. This plays havoc with the intentions of the agriculturist. He tries to get rid of this salty deposit by deep tilling, but this will not always work. When the department determined that this salty crust was one of the important handicaps of the irrigation schemes, it undertook to find a plant which would neutralize these salty deposits. This was the quest of David G. Fairchild, and he reports that he found in berseem, the fodder and soiling plant of Egypt, *Trifolium Alexandrinum*, just the thing for a rotating crop for irrigated land.

Berseem is described as the Egyptian clover, and is closely related to the American red clover. And this plant is confidently expected to be useful not only in eating the salts that gave trouble in Western arid lands, but also helps fertilize soil, as well as furnish a fodder for stock. The Government is also conducting other experiments with the view of aiding fertility, among which are experiments conducted at Niagara Falls, with the hope of learning how to produce nitrates at a low cost, so that they can be sold for fertilizing purposes. The information contained in the Washington reports along this line are as follows:

"The plan is to burn air in electrically-heated cylinders and secure nitric acid, which may be 'fixed' in various substances for commercial use. It is a long cry from the clover crop of the Lower Nile to the perfect scientific machines of the Niagara Water Power Co., yet the Government agricultural agents are watching both for the same purposes. They both affect the problems involved in enriching the rapidly thinning soils of America. The call is for cheap nitrates. The experimenters at Niagara say that they will be able to produce nitric acid fixed in some substance suitable for fertilization so that it can be sold for about half the commercial price of the day. If they succeed, and the whole power of the falls were used, enough would be produced for all the farms in America. The raw product is universal—air.

"The chase for nitrates for fertilizing purposes is most fascinating. The most common method of enriching the soil is with manure. Equally well known is the use of rotating crops, where leguminous soiling plants are employed. In other words, plants are used that have long, slender roots, beaded with little nodules filled with nitrogenous matter. The leaves take this nitrogen from the air and the roots leave it in the ground. This is very slow. The United States Government is constantly in search in the various agricultural districts of the globs to secure suitable leguminous plants (soiling plants) for suitable and profitable use in various districts. With these it is proposed to maintain the present standard of good soil, reclaim waste and barren lands and give new life to worn-out lands. The specialist in irrigation is now looking to Egypt, the fellahin, for great help.

"This fertilizer is sought in the nitrate beds of South America, where, ages ago, tropical leguminous plants left nitrate deposits. The surfaces have been scraped from guano isles, and that supply is fast disappearing. The phosphate beds of the South are yielding less and now the agricultural expert looks anxiously to the great machines at Niagara, driven by the weight of the water in the inland seas, and hopes that within a few years they will turn out an inexhaustable supply of nitrates, at a comparatively low cost, for the farmers.

Slag as a Fertilizer.

Under a separate head the possibilities of blast furnace slag is mentioned as being used as a fertilizer, but we append herewith, for the benefit of those interested in fertilizers a more extended comment by Edwin C. Echols, of the United States Geological Survey:

The highly phosphatic slags produced by basic Bessemer converters are valuable fertilizers and are of great economic importance. In Germany, especially, large quantities are annually sold under the name of Thomas slag. In slags produced by this process the content of phosphoric acid usually runs from 10 to about 25 per cent. The Scheibler modification of the process greatly increases the phosphoric acid content of the slags, but is practiced to only a very limited extent.

The possible commercial value for agricultural uses of these high phosphorus slags produced by the Thomas-Gilchrist process was early recognized. At first, however, it was argued that in an untreated condition they would be useless as fertilizers; that the phosphoric acid they contained was not directly available for plants, and that the ferrous oxide would probably prove positively injurious to vegetable life. Attempts were accordingly made to dissolve out the phosphates of the slag and reprecipitate them. Fortunately this treatment was soon shown to be unnecessary, for field experiments with finely ground but otherwise untreated slags proved that they were excellent fertilizers. From this date onward the use of Thomas slag as a fertilizer has increased steadily, and it is now an important article of commerce. Regarding the chemical composition of these slags, facts of great economic importance were brought out by the work of Hilgenstock and later investigators, and the efficiency of Thomas slags as fertilizing agents is now explained. In rock phosphates the phosphoric acid exists combined with lime as the tribasic lime phosphate ($3CaO2P2O5$). In the slags above mentioned, however, the combination existing is the tetrabasic lime phosphate ($4CaO2P2O5$). These two compounds differ greatly in the degree of their solubility in saline solutions, the tetrabasic phosphate being much more soluble than the tribasic. For this reason the phosphate slags are more efficient as fertilizers than the mineral phosphates. Jensch states that about 1½ per cent. of the total phosphorus of slags is present in the form of phosphide of iron, which is changed into phosphate in the soil.

Many types of crushers and mills have been experimented with in the pulverizing of Thomas slag. The ball mill, however, seems to be the only one capable of economically crushing this product to the fineness required—75 per cent. through a 100-mesh sieve.

A process has recently been patented for preparing a useful fertilizer in a dry condition from waste sulphite cellulose liquors. These are evaporated to a sirupy consistency and mixed with an equal quantity of Thomas meal. The mixture almost immediately becomes solid, and can be broken into small pieces. Nearly the whole of the phosphoric acid of this fertilizer is soluble in citrate solution, *i. e.*, is in a condition suitable for utilization as a fertilizer; in fact, 98 per cent. of the phosphoric acid is citrate soluble, as against 83 per cent. in the original Thomas meal.

During the year 1901 about 1,000 tons of phosphate slag produced in the United States were sold as fertilizer. This American material has been tested by the Maryland Agricultural Experiment Station, the report of the results being that slag phosphate gave a greater total yield than did any of the other insoluble phosphates. The yield of corn with slag phosphate was not quite so much as with bone meal, but the yield of wheat and of grass was greater. All yields were produced at less cost with slag phosphates than with bone meal. The slag used in these experiments was a commercial sample and contained 16.32 and 22.24 per cent. Other commercial analysis of this fertilizer show phosphoric acid contents of 21.03 and 22.24 per cent. A complete analysis of the slag from the Pottstown (Pa.) converters is given in the preceeding table of analysis.

The slags produced in steel plants using the open-hearth process are less valuable as fertilizers than those produced by basic converters, as the former contain less valuable as fertilizers than those produced by basic converters, as the former contain less phosphoric acid and more silica and lime than do the basic Bessemer slags. A two-stage modification of the open-hearth process—the Bertrand-Thiel process—gives slags higher in phosphoric acid than ordinary open-hearth slags. It is even claimed by Thiel that the Bertrand-Thiel process produces a greater value of slag, if both quantity and phosphoric acid content be considered, per ton of finish steel, than does the Thomas-Gilchrist process.

The slags resulting from processes other than those above noted are not sufficiently phosphatic for use as high-grade fertilizers. Elbers has, however, called attention to the fact that highly calcareous blast-furnace slags might be profitably used as fertilizers in place of the other forms of lime (marl, shells, etc.) now used by farmers. In 1901 a company was organized with the object of marketing for fertilizing purposes some of the calcareous slags from Birmingham (Ala.) district. Active operations were not commenced, however, before the close of the year.

SIDE TALK.

We have received from the American Cement Co., Philadelphia, Pa., a book, entitled "The history of the cement industry in the United States," by Robert Lesley. We have in this work some authentic data and information surrounding the early development of the cement industry, not only in the United States, but in the inception of the industry in England.

We have received a catalogue from the Wood Drill Works, 30-32 Dale Avenue, Paterson, N. J., for 1902, illustrating and describing the rock drilling, mining and quarrying machinery manufactured by this firm. Their specialties are rock drill and drill mountings which are nicely illustrated in this book, which they will be pleased to send those interested on request.

The Inter Ocean Stone Co, 509 Ashland Block, Chicago, Ill., with a quarry at Lemont, Ill., advises us from Lemont that they desire to make correction of a recent item in regard to the Brownsville Stone Co., as there is no such company there as that, and the firm name is the Inter Ocean Stone Co. They also inform us that they have material for making the finest Portland cement in the world, and would be glad to hear from any one desiring to go into the cement business.

The Philip Carey Manufacturing Co., manufacturers of the well-known line of Carey's magnesia, asbestos and asphalt materials, inform us that they have closed a contract of unusual interest. After considerable time spent in study and experiment on different kinds of material, they were awarded a contract to furnish their 85 per cent. carbonated magnesia covering for the power station of the Manhattan Railway Co., 74th and East River Streets, New York City, amounting to approximately $25,000.00. As this is one of the largest contracts of this kind made in recent years, they naturally feel elated over the selection of their goods.

The Explosives Manufacturing Co., 305 Robinscn Building, Elmira, N. Y.—Replying to your inquiry for information about Joveite, we inclose you one of our booklets, which will give you a very good idea of what this explosive is and how it is used. The descriptive pamphlet reads in part as follows: "Joveite is a rupturing explosive like the dynamites and nitroglycerine powders, and is made in different grades; but grade for grade it is more powerful and efficient than dynamite, so that smaller charges by weight may be used. In form it is a granular, free running powder of about the consistency of coarse corn meal, and is supplied in bulk like black powder, or in sticks like dynamite, according to the wishes of the consumer. It is fired like dynamite, by means of blasting caps, detonators and electric primers."

We have received from the Contractors' Supply Co., 1530 Monadnock Block, Chicago, Ill., a catalogue illustrating the rock drills, air compressors, etc., manufactured by the McKiernan Drill Co., 170 Broadway, New York City, and handled by the Contractors' Supply Co. One of these catalogues, not only illustrates the drills and appliances, but gives important instruction and technical information in regard to the correct operation, also directions for ordering items for any broken parts, and this catalogue should be in the hands of every concern operating McKiernan drills. The other catalogue covers the air compressor subject in pretty much the same manner as the one just mentioned covers the subject of drills. The Contractors' Supply Co. are among our advertisers, and will be glad to quote you prices on anything from a piece of drill to a full equipment, as well as furnish any information you may desire about equipping a quarry with compressors.

Trade Prospects.

Dyer, Tenn., will construct waterworks.

Des Moines, Iowa, will do some brick paving.

Cedar Falls, Iowa, will do some brick paving.

St. Joseph, Mo., has ordered more brick paving.

Mena, Ark., has voted $25,000.00 for waterworks.

New Orleans, La., is to do some asphalt paving.

Winnsboro, S. C., will construct an electric light plant.

Nashville, Tenn., is preparing to do some street paving.

Harriman, Tenn., contemplates the construction of sewers.

Fort Worth, Texas, is figuring on doing some street paving.

Memphis, Tenn., is to spend $221,000.00 for asphalt pavings.

Santa Rosa, Cal., is to have a Carnegie library to cost $20,000.00.

Riverside, Cal., is to have a new court house, costing $115,000.00.

Lake Charles, La., contemplates constructing a system of sewers.

Sweet Springs, Mo., will build an electric light plant and waterworks.

Burlington, Iowa, will let contracts October 6 for some brick paving.

Cincinnati, Ohio, will open contracts October 15 for asphalt paving, etc.

Robert J. Boone and others will build an electric light plant at Marianna, Ark.

Newark, Ohio, will let contracts October 13 for brick paving, stone curbing, etc.

Toledo, Ohio, has street improvement and sewer construction projects under way.

W. T. Avera and others contemplate building an electric light plant at Pocahontas, Ark.

J. S. Stearns is building a hotel at Ludington, Mich., out of cement, to cost $40,000.00.

Wilkes Telephone Electric Co. has been organized to operate a telephone system at Washington, Ga.

The plans of Thayer & Hanson, Seattle, Wash., have been accepted for public buildings at Juneau, Alaska.

The Consumers' Light and Water Co. has been incorporated at Belzona, Miss., with a capital stock of $100,000.00.

Summerland & Marcum, Bartow, Fla., are to build an electric light and refrigerator plant at Plant City, Fla.

A new court house is to be built at St. Francisville, La., to cost $30,000.00 after plans of Andrew J .Bryan & Co., Jackson, Miss.

George Kessler will erect a new exchange for the Keystone Telephone Co., Frankfort Ave. and Summerset Street, Philadelphia, Pa.

The Crescent Paving Co., Buffalo, N. Y., has been awarded a paving contract at Niagara Falls, N. Y., involving $27,000.00 in the work.

J. O. O'Rourke & Co., Denver, Col., has been awarded a contract to erect a sea wall at Galveston, Texas, involving over $1,000,000.00.

Architect Thos. Scully has drawn plans for a six-story building at Carondelet and Common Streets, New Orleans, La., to cost $150,000 00.

Bids will be opened at St. Paul, Minn., December 2 for interior stone and marble work, etc., in the new Capitol, the time having been extended from October 7 to this date.

Messrs. Geo. F. Payne & Co., Philadelphia, Pa, have been awarded the contract to finish the capitol building at Harrisburg, Pa. The contract involves something like $3,500,000.00.

Information Bureau

A Few of the Direct Inquiries Made to the Office of Rock Products During Last Month.

If you do not see what you want in ROCK PRODUCTS, *write us about it.*

300.—We wish to install machinery for grinding and bottling slate into paint.

301.—We want pulverizers.

302.—We want a good second-hand air compressor.

303.—I am in the market for a complete outfit of brick machinery.

304.—I want to know something about rock crushers.

305.—I want wire rip saws to saw blue limestone, and information regarding same.

306.—I want second-hand T rails, 12, 15 or 20 pounds.

307.—We are in the market for a small gas or gasoline engine.

308.—We want two or three pneumatic tools for cutting marble.

309.—I am in the market for vitrified tile, 6x9 or 7x9 and 1 in. thick, for roofing to lay in cement.

310.—We want to correspond with a firm that makes a centrifugal pump that will successfully pump gravel.

311.—We are in the market for a dynamo for 100 incandescent lights.

312.—We want asphalt.

313.—We are in the market for slate roofing.

314.—"I mail you samples of marble from a ledge situated twelve miles from the Southern Pacific in Southeastern Arizona. The ledge is ten miles long, and in places over 1,000 ft. thick, with an incline from 45 degrees to vertical. There are great quantities and of various colors, especially the white, which varies from 50 to 500 ft. thick. There is a gentle decline of about 30 ft. to a mile from the ledge to the railroad, ten miles of the distance being over a smooth valley, which would require very little grade to open a railway spur to it. There are several springs on the property which will furnish sufficient water for operating a steam plant for quarrying and manufacturing. The altitude is about 4,000 ft., and the climate is comfortable every day of the year. The fuel is scarce, but can be secured from California or Texas coal fields. The railroad company inform me that they will do everything they can to assist the development of the property, and place the product on the market. There is also on the property a large ledge of black limestone, which simple tests show to be hydraulic, but it sets slowly under water. This, it seems to me, would prove valuable for cement manufacturing, and the outlook here, it would appear, will demand the production of cement somewhere in this territory in the future. Can you enlist capitalists in this enterprise? If so, I will be glad to furnish larger samples and other information desired."

The samples submitted were a beautiful white, a white and yellow figured, a mottled white and black, and black marble with tracings of white. They all were nicely polished, showing that the material will polish well, and the writer, who was also the polisher, knows his business.

315.—"In prospecting for other material, we have unearthed a deposit of what we think is a very fine fireclay. Having little knowledge of fireclay, its value, the commercial demand for it, and whether the market will warrant opening a deposit of this material in this part of the country (New Mexico), we would like to be referred to some competent authority on the subject, to whom we may submit samples, in order to ascertain their commercial value."

316.—"I own and control leases on about 1,200 acres of mineral land in New York, on which are fine fissure veins from 30 to 40 ft. wide, containing feldspar, quartz and mica of excellent quality, though the mica is somewhat clouded near the surface. Being financially unable to develop this land and wishing to interest parties who are, I will be pleased to furnish samples to any one interested, and give full particulars in regard to the property."

317.—"We will appreciate it if you or your readers will answer the following question: At what temperature does quartz calcine, and under what conditions? Is there a known process for softening quartz rock?"

318.—Would like to have some information in regard to the qualities of an artificial stone that has recently made its appearance, called litholite.

319.—We want gravel screens.

320.—We are in the market for builders' material.

T. Kelly, West Superior, Wis., has been granted a patent on artificial stone facing for buildings.

The Howell Mining Drill Co., Plymouth, Pa., say they are now figuring with several plaster works for air drills, and hope to be able to report large contracts in the plaster industry at an early date for Howell drills. As a testimonial along this line, they quote a letter from the Alabastine Co. (Ltd.), manufacturers of alabaster and calcined plaster, Paris, Ont., which reads as follows: "The machine has come to hand. Inclosed herewith, please find our check for $29.40 in payment of same. Kindly acknowledge receipt. We have tried the same, and it works nicely. Drilled a hole in twenty minutes that in the old way took the miners two hours."

Wanted and For Sale

One insertion, 25c a line; Two insertions, 50c a line; Three consecutive insertions with no change in the composition, 56c a line. Count eight words to a line; add two lines for a head.

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A GOOD BUSINESS OPPORTUNITY—We desire the services of a party acquainted with the stone and lime business who can invest some money and take a working interest in our Company with headquarters in Chicago. Reference required. For particulars and terms, address ROBERT G. McGANN, 1290 Old Colony Building, Chicago, or the Company. Address THE NATIONAL NEW PROCESS LIME CO., 39-41 Cortland Street, New York.

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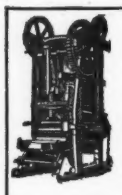
RESURRECT the dead capital in that machine you no longer need by inserting the advertisement here. Quick returns at a small cost. Try it.



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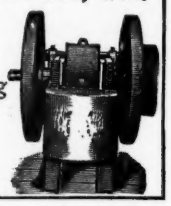

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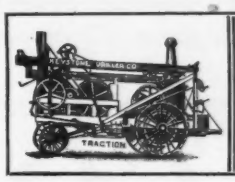

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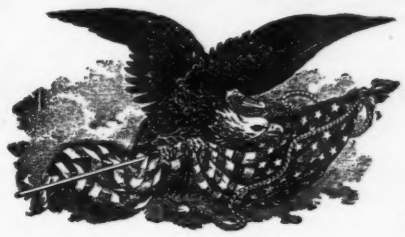

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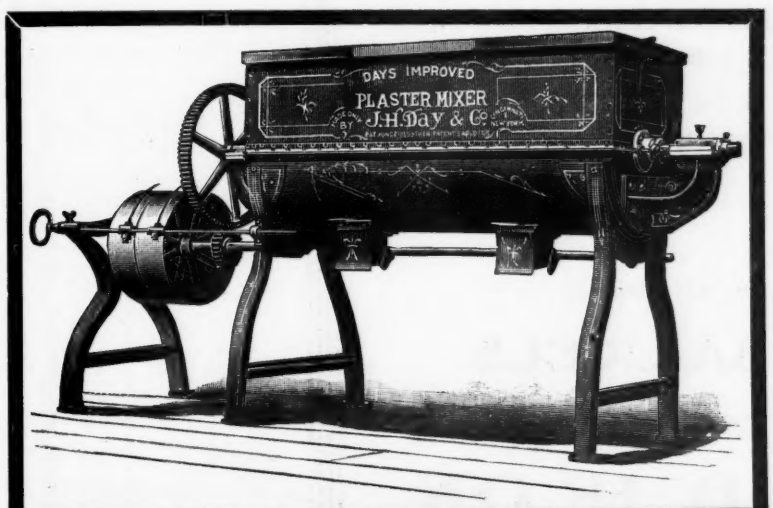

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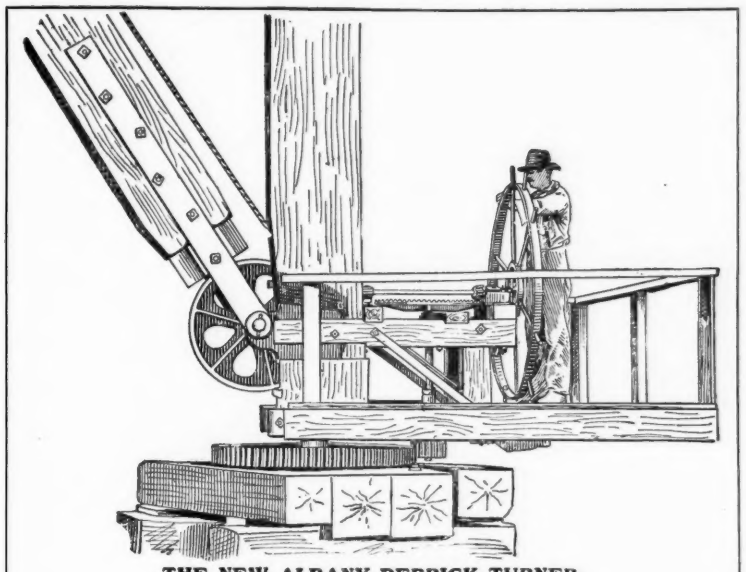

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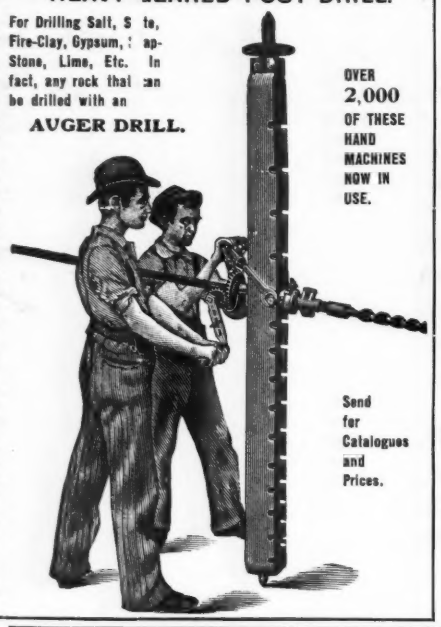

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